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BY

W. PREYER

PROFESSOR OF PHYSIOLOGY IN JENA

AUTHOR OF

THE MIND OF THE CHILD (PART I. THE SENSES AND THE WILL; PART II. THE DEVELOPMENT OF THE INTELLECT)

TRANSLATED FROM THE GERMAN

BY H. W. BROWN

TEACHER IN THE STATE NORMAL SCHOOL AT WORCESTER, MASS.

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EDITOR'S PREFACE.

THOSE who have studied the careful observations on the growth of the mind in childhood recorded in the two volumes of this series entitled respectively The Senses and the Will and The Development of the Intellect will be interested in receiving from the author, Dr. Preyer, further reports of the results and conclusions which he has reached after time has permitted wider surveys of the field, new verifications, and more deliberate reflection upon the data given.

The special object of this book, as announced by Dr. Preyer in his preface, is to initiate mothers into this complicated science of psychogenesis. Accordingly he has taken unusual pains to present the more important points upon which the development of the child's mind depends in a form easy of assimilation. He desires to evoke a widespread interest in the development of the infant mind, and lead to a multitude

of special investigations into the phenomena of the first five years of the child's life.

This movement, known as "child study," has received great impulse in this country within a few years, especially through the labors of Dr. Stanley Hall, who may be called the pioneer and enthusiastic promoter of the good work. Prof. M. W. Humphreys, of Tennessee, and Prof. Edward S. Holden, of California, published their investigations into the vocabularies of children soon after Darwin published his biographical sketch of his infant son and Taine his essay "Sur l'Aquisition du Langage." Mr. E. H. Russell, Principal of the State Normal School of Worcester, Mass., was one of the first to commence in his school a systematic collection of data regarding the development of children. Recently, Prof. Earl Barnes, in the Leland Stanford, Junior, University, has made large additions to our knowledge of the development of the conceptions of children in regard to art, religion, and some other fields. Every day one comes to hear of some new laborer in this province of pedagogy.

The results recorded in this volume are chiefly of three kinds:

1. The order of development of the senses—taste, smell, touch, hearing, sight; the feelings of temperature, the emotions of fear, astonishment, and anger; the intellect and will, language and self-consciousness.

2. The characteristic marks by which the several phases of these activities are to be discriminated and known. For example, the author makes the intellect begin to manifest itself by placing its impressions in space and time—the notions of space and time are said to be added to sensation, thus converting it into perception. When the cause of the perception is apprehended the perception becomes an idea. Space, time, and causality are therefore three criteria of the highest order in our investigation of the development of the infant mind in its earliest stages. It is well to understand with the greatest fullness what the development of the idea of causality means to the mind. It is nothing less than the process of emancipation of the mind from dependence on immediate sense-perception. There is first a perception of an object present—here and now—before the senses. This perception is repeated of the same object and of other objects of the same class. By the introduction of the idea of cause the mind comes to understand the mode of production of these individual objects. It understands, for instance, that leaves grow on trees as their producing causes; that fire will bake cakes; that human beings and many animals produce various sounds with their voices. On seeing an object, a leaf, or a cake, it instantly goes back to the source and through a common cause associates the present object with others of its kind. The act of recognition of its class,

and a consequent anticipation of observation by bringing to its aid its stored-up experience regarding the modes of action which the cause of the present object has shown itself to possess—this is a step in emancipation from sense-perception. The mind acts less in sense-perception and more in apperception. It spends less time in touching, tasting, smelling, hearing, seeing, and more in recognizing and identifying what is before it and thereby adjusting it to the aggregate of experience already acquired. This apperceiving or adjusting of the new perception to the perceptions already stored up involves, as we see, first memory, and next thought. Memory brings back to consciousness old percepts and old ideas and thus renders possible the act of comparison of the present object perceived with the absent objects remembered. Thinking or thought deals with the causal principle, and understands objects by relating them to the causal processes by which they have originated and are accustomed to originate. The child does much staring and listening and touching compared with the man. The man needs only a first glance or a first note, and he identifies and recognizes the sight or sound and at once classifies and places the new object correctly in its process and understands it. He does not need to continue the act of perception so long as the child, for thought, employing the causal idea, has emancipated him to a greater or less degree from mere perception.

The causal genesis of objects is of a higher order of being than the objects perceived by the senses. The former contains the latter potentially. A cause is worth a whole series of effects. The hen in the nursery tale that laid the golden eggs was a living causal process, while the eggs were mere dead results or effects.

Prof. Preyer will not be thought to lay too much stress on the perception of causality as the criterion of intellect, in contrast to sense-perception. In fact, the change from sense-impression to sense-perception by the time and space notions may be said to take place through an unconscious application of causality —a causal feeling, so to speak. For the child perceives time and space, or objectifies his impressions, by referring them to another source than his own will —that is to say, than his own personal causality.

From the idea of cause, which is the all-important idea in explaining the genesis of the intellect and the unity of experience, the transition is easy to the idea of will; for the will is a personal causality. Prof. Preyer makes the act of imitation to be the first sure sign of the development of the will. Imitation shows the consciousness of power to originate motions. It shows, moreover, the act of recognition of the origin of the motion which it imitates in another cause than itself. The child recognizes in some motion the action of another causality than itself, and it repeats

within itself this act which it has observed, thus reproducing it or imitating it.

The delight which the mother feels when her child first learns to imitate is explained—it is the first recognition of the existence of veritable will power, of true conscious self-determination. Parents are apt to speak of cases of stubborn resistance or persistence on the part of infants as cases of willfulness, but stubbornness is not a reliable sign of will; it may be, as in the case of lower animals, a mere instinctive action. Imitation, however, is a sufficient indication of the exercise of the veritable will. And this, of course, must be true of such animals as monkeys, parrots, dogs, and other animals that can be taught imitation—they show the rudiments of will.

Arrested development at the standpoint of imitation, we all know, produces the much despised lower order of human intellects—the men and women of mere use and wont—blind followers of custom.

3. Prof. Preyer has demonstrated with sufficient clearness the existence of intellect without language. The ideas of space, time, and cause are prior to the ideas that usher in the stage of language. Of course, the influence of language reacting upon the intellect is very great, as Prof. Preyer himself expressly shows. Language may be said to arise from the side of the will, inasmuch as it is an evolution from the imitative activity of the soul. It contains both recognition and

reproduction, and thus not only intellect nor mere will, but both will and intellect in joint activity.

According to one view, the soul is a product of the organism; according to another view, the organism is the product of the soul. Both views have scientific value, of course, but, taking the latter view in the interest of religion and humanity, we explain every step of building the body, from the embryonic stage up to the mature man, to be the action of a self-determined being taking possession of matter and stamping upon it its own image and giving it the form of organic cells. It uses its organism to attack its environment and gain new means of expression and new means of conquest.

Even the plant exhibits to us a self reacting on its environment and assimilating it to vegetable cells. The infant animal shows us reaction upon its environment of two kinds: one, that of using it for food, and a second, that of sensation, in which the inner causality reacts against the environment in such a manner as to produce perception or representation. It is, by analogy, a kind of reproduction of the environment within itself for its own purposes. This is a new and higher order of reaction, breaking out, as it were, against the lower order of reaction, that of mere digestion or assimilation; for it does not condescend to act on external matter, but tries to reproduce its environment through its own energy. The infant child shows us both these phases of reaction, and also

a higher reaction against the two lower in the form of thought. For thought is opposed to mere animal reaction, to mere imitation, representation, or reproduction of the environment, as well as to mere plant reaction, which is a struggle to convert that environment into cellular tissue. It evidently aspires to free itself altogether from its thraldom to any environment except one of its own make. It does this by appealing to the causality that has made its environment, and dealing with that causality first-hand, instead of with its dead results, the objects of sense-perception. Hence, the really human interest in the development of mind is this struggle toward what Immanuel Kant called "transcendental freedom."

The ego is itself a transcendental freedom, according to this second or humanitarian view of the soul; and most interesting of all phenomena are the struggles of the infant child to find in himself, and become conscious of, this transcendental freedom. The most easily observed of these is the adoption of moral ideas whereby the soul renounces the immediate gratification of the body for the preservation of the integrity of its inner self-determination—makes naught of its material environment for the sake of its supersensible ideals.

But the rise from the standpoints of sense-perception and loose habits of reflection to scientific habits of mind is likewise a manifestation of the same tran-

scendental freedom. It is the resort to a supreme rational norm in preference to holding by the two lower intellectual activities dominated by the accident of environment, or, in other words, by the temporal interests prevailing. If I allow myself to be controlled in the objects of my perception by the time and place that I happen to be situated in, or in my objects of reflection by my equally accidental environment, I do not possess the scientific habit of mind; for that chooses its object, and proceeds systematically to exhaust it.

The infant child at first is not able to use his body, neither his muscles nor even his brain cells. His development takes two lines—to master the afferent and the efferent nerves. Hidden behind his mask (of the body) at first, he gradually emerges to view. He gets control of his apparatus and develops new apparatus. By his energy and perseverance he gets the use of his muscles and brain cells, and develops new fibers between those cells so that he can associate all manner of data of experience.

Unless he acts intellectually his brain cells and connecting fibers will not develop. The ganglionic cells are lacking or very scanty at first, we are told. These develop for the uses of the soul, if it energizes and uses them.

Our human interest in the child is in seeing his freedom develop. The growth of the infant is first into freedom *in* the body, and next into freedom *from*

the body. By science, philosophy, ethics, religion, politics, art, and literature man is emancipated from the narrow limits of his bodily environment and made a denizen of the world of spirit—made a member of the "invisible church."

W. T. HARRIS.

WASHINGTON, D. C., *September 5, 1893.*

AUTHOR'S PREFACE.

MORE than ten years ago I published a treatise on the mental development of the human being in the first years of life, with the title Psychogenesis. The problems touched upon in that treatise were afterward handled in detail in my book The Mind of the Child (Die Seele des Kindes), the first edition of which appeared toward the end of the year 1881, and the third edition, revised and enlarged, in March, 1890; and it is not too much to say that this new department of physiological pyschology is now firmly established. Investigators in the most diverse special provinces of medicine, language, pedagogy, are turning more and more to the observation of their own children during just those years in which speech is acquired, and we can foresee that at no distant date will appear special text-books upon the physiology and pyschology of the child from the first year to the fifth year of life. But before that takes place a great deal

more work must be done; and in particular, a more widespread interest in this subject must be evoked, and where interest already exists it must be augmented.

For, after all, the observation of mental development in the earliest years naturally falls to the mother more than to any other person. But in order to initiate mothers into so complicated a science as that of pyschogenesis, the results already attained in it must be presented to them in a form as easy of assimilation as possible. Other persons also—teachers, both male and female, fathers, older brothers and sisters—are to be induced to consider the importance of the facts in this field, which has indeed been lying open for hundreds of years, but has been little trodden, and is therefore a new field.

For these reasons I shall endeavor, in response to oft-repeated inquiries and requests, to put together some of the more important points upon which the development of the child's mind depends. But here I wish to say expressly that it is impossible to take note of everything that from a scientific or practical point of view would be prominent—for example, the growth of the religious sentiment, the development of conscience, the advent of the passions—because there is as yet too great a lack of trustworthy and coherent observations. What I have to say has been selected from the pretty extensive and securely grounded ma-

terial in our possession, with special reference to practical use and application.

Of course it is not for every one to confirm by his own observation all my statements of fact; for it is no easy thing in the case of an individual child who is in active movement, changing every instant the direction of his attention, altering his expression, and babbling unintelligible sounds, to ascertain what is in accordance with law. He only can reach the goal who, with the greatest patience and after preliminary studies in physiology and psychology, occupies himself persistently and impartially with several children. Knowledge of mankind is not gained by the mere theorizer, but only by him who with ripe judgment and personal experience has intercourse with men. Although the little child shows himself to the observer always without the least dissimulation—*unveiled* in both the literal and the figurative sense of the word—still there is great danger, with the anthropomorphic tendency of most people in their way of looking at things, that more will be attributed to the child than actually belongs to him. Moreover, knowledge of mankind is not of much help here at first, because everything which at a later period comes forth, obscurely or openly, is now present only in the germ. On the other hand, the observation of untrained animals, especially young ones, and the comparison of the observations made upon them with those made upon little children,

have often been found by me very helpful toward an understanding of children; and I hope from the completion of a *comparative psychology*, together with the inauguration of psychogenetic observations, more results than from the prosecution of earlier psychologies of a more speculative sort.

As to the foundation of my statements in detail, the reader is referred to the work mentioned at the beginning, The Mind of the Child.

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ON THE DEVELOPMENT OF MIND IN THE CHILD.

CHAPTER I.

THE SENSES OF THE NEWBORN CHILD.

THE senses are the only gate at which the world enters the mind of man. If that gate is closed, he is not properly in the world, is not in connection with it; the world does not exist for him; the case is the same as in dreamless sleep. In fact, if a man is deprived of one single sense his whole view of the world is changed. Blind or deaf persons, who lack from their birth one of the two principal senses, can not rise to the height of intellectual development that seems attainable, as a matter of course, for the normal child even in play. For the blind man, in his view of things, misses not only impressions of light and color, but also the forms of objects beyond his grasp; while letters, printed books—the memory, as it were, of educated man—are accessible to him only in a very slight degree. He is like the climber who can not get up for lack of means. And the deaf?

His world-view lacks not only tones, the entire realm of music and song, but speech, the living word, the very thing that binds man to man and holds together, through a common intellectual life, all who share a higher culture. Any compensation that can be afforded through the senses of touch and sight is, even with the greatest pains, far from adequate.

It is, then, important above all to keep open the two higher senses in earliest youth. The newborn child enters a world of light and sound, but he can not yet see or hear. He does not feel, in the degree that he will feel at a later time; single pricks of a needle often produce not the least expression of pain in him, and in the first moment of existence he can not properly smell or taste. All this he must first learn.

In this matter it is singular enough that the last-mentioned sense, taste, is universally the first to be learned. At any rate, only a few days pass before newly born children distinguish sour, bitter, or salt from sweet. The taste of sweet is plainly preferred at the very beginning. The little countenance, after the wetting of the tongue with glycerin or with a concentrated solution of sugar, wears almost invariably an expression of satisfaction. But let the tongue be touched with a solution of quinine, warm and not too much diluted, or with common salt, or let it be smeared with a crystal of tartaric acid, and movements

of repulsion readily appear, accompanied with choking, with screaming, and with an expression of extreme displeasure on the face. It is true that alternations of mimetic expression are frequent in the very first period of life, so that the conscientious observer must often be in doubt whether the various tastes are really correctly distinguished. The nervous apparatus in general is, in fact, not yet fully developed. The nerve extremities in the delicate taste-bulbs of the tongue, the gustatory-nerve fibers, the gustatory sphere in the brain, as yet lack exercise, practice. But that these portions work rightly earlier than the other organs of sense is certainly of great advantage to the young child as well as to the newborn mammal, because thereby the discrimination between wholesome food and harmful is made possible early, and soon becomes very much more acute.

For the same reason, the surprisingly rapid development of the faculty of smell in the newborn human being must likewise be of advantage to him. Directly after birth, indeed, and often for several days, the child is not able to distinguish with certainty, at every trial, between substances of agreeable and those of disagreeable smell. Very often he mistakes something he can smell for something to eat—e. g., he will suck steadily at the fragrant hyacinth. Still, it is probably possible for him by the sense of smell alone to distinguish the breast of the nurse from that of his

mother, and the milk of the cow from the milk of the breast, before it touches his lips, as early as one day after birth. At any rate the normal child can smell many things rightly when a few hours or, at most, a few days old; for his countenance changes in a very marked manner when ill-smelling substances are offered to him, or when he is put to a breast that is disagreeable, whereas he has an expression of satisfaction when smelling good milk and a clean skin.

The third of the lower senses, so called—the cutaneous sense—is developed much less rapidly, although the nerves of the skin are very excitable from the first. The distinction between cold and warmth, and between different kinds of contact, is extremely imperfect in the first days of life. That the child cries in a bath too cool for him does not show that the water is felt as cold, but merely as uncomfortable, just as warm water produces very early a most contented expression. The discrimination that comes later through the sense of temperature, the preference of contacts that occasion an agreeable feeling of warmth, the dislike of washings that occasion the disagreeable feeling of cold, can be developed only by practice, through alternation of the two opposed impressions, which alone makes comparison possible; and without comparison there can be no discrimination between cold and warmth. How little ability the child has at the beginning to distinguish strong pressure from

weak, a grip or thrust that hurts from a mild one, the cold, wet hand from the warm, dry one, we discover by touching the surface of the body at all possible places; for the child does not resist, does not make even the most ordinary defensive movements of a reflex character at the unpleasant impressions, nor does he smile at the pleasant impressions. All these distinctions in the province of the cutaneous sense are the result of very frequent repetitions of changes in the external impressions received during the child's waking hours. Now, inasmuch as the human being in the first period of his life is asleep much more than he is awake, the time that remains for him daily for learning to distinguish these impressions is rather short, and accordingly the period of learning is long. This is true particularly of the higher senses, sight and hearing, on the development of which most depends.

Every child when just born is completely deaf, and sometimes several days elapse before the tympanum, with the auditory ossicle, is capable of conducting external impressions of sound properly to the brain, which is as yet by no means sufficiently developed for hearing. And even when these days have passed, the hearing must be called very bad. A difficulty of hearing continues to exist normally for a long time, and this peculiarity is of great benefit to the child; for, if he were able to hear as well as an adult, he

would be altogether too much disturbed just in that first period of life when he needs to rest most of the time, in order to further the processes of nutrition, the forming of fat, the solidification of the bones, the regulation of the respiration and of the activity of the heart. He would be frightened in his sleep, too, and exposed to violent movements, even to convulsions. Still, there are children who as early as six hours after birth indicate by a movement of the eyelids a certain capacity for hearing when unusually loud noises are made close to the ear. Whether in this case the movement of the lid is to be regarded as occasioned by the sound alone, or possibly by the current of air, must be uncertain. The latter would seem unlikely, inasmuch as all adult human beings, without exception, while they wink involuntarily at a loud report or other sudden noise, do not wink at a noiseless current of air, except when it is very strong. In any case, no child is able to hear, out of the many thousand loving words its mother speaks in the first weeks of its life, more than single, loudly uttered ones; and as to understanding them, of course that is out of the question. But the child becomes in this way accustomed to its mother's voice, and therefore at a later period recognizes that more easily than other voices.

With the sense of sight in the newborn child the case is in many respects much the same as with the

sense of hearing; for, although the child does not, like puppies and kittens, come into the world with the eyelids tightly closed, and can not be called blind in the strict meaning of the word, yet he is quite incapable of seeing. During far the greater part of the day the eyes are actually closed, or the opening of the lids is very small. Closer observation shows, however, that as early as a few minutes after birth a contraction of the pupil takes place upon the entrance of moderately bright light. This shows that there exists already sensibility to light. By so simple an observation is proved incontestably the permeability of the entire nerve-path from the retina through the optic nerves to the central portions, from these back through the motor nerve of the eye, the *oculo-motorius*. It is easy, also, to convince one's self that very bright, dazzling lights occasion, even on the first day, if the eyes are open, a close shutting of the lids; while, on the other hand, moderately bright surfaces cause the aperture of the lids to widen to the extent of a millimeter. Such facts demonstrate that sensibility to light exists in the human being from the very beginning, in contrast with several of the mammals.

But no color whatever can be distinguished from any other, nor are boundary lines, intervals, or forms perceived. The whole field of vision makes a confused mass of bright and less bright portions, in

which, in general, only the grosser differences of luminosity are perceived.

The field of vision at the beginning of life resembles a chart, placed close to the eyes, upon which the colored, the bright, and the dark parts of the surface blend with one another so that nothing is distinctly apprehended. It is idle, therefore, to dispute whether the newborn infant sees an object single, not double, with his two eyes; or whether he sees it upright, or upside down; or whether he confounds right and left in the field of vision. In reality he sees no objects at all yet, and is very slow in learning to distinguish between above and below, left and right, near and far, by means of the motions of things, by the movements of his own eyes, and by his attempts to seize objects. The alternation of brighter and darker is not observed until it takes place with larger surfaces and with a certain rapidity not excessive or deficient—unless the bright is dazzlingly bright, like the flame of a lamp. In the latter case the brightness is felt at once, for it occasions a quick shutting of the eyes. Where this shutting does not take place in the very earliest period, there is, in fact, a doubt as to the normal constitution of the eye and of the portion of the nervous system belonging to it.

In every sensation of light, therefore, including, of course, the first one of the newborn child, we must make a threefold physiological distinction: first, the

excitement of the extreme end portion of the optic nerve, the retina in the back part of the eye; second, the propagation of the excitation through the fibers of the optic nerves to the very complicated central portions; third, the transformation of the nerve-excitation into a sensation of light in these portions. All the three constituents of the nerve-excitation that produces the sensation of light—the peripheral in the eye, the conductive in the nerve, the central in the brain—may be lacking at the beginning of life; and it is evident that those children who do not react at all upon strong light must be suspected either of not having normal retinas, or of not being sufficiently developed as to the conducting fibers of the optic nerve or the portions of the brain belonging thereto. In fact, the development in the case of children born from four to six weeks too soon is generally behindhand, and the extraordinary sluggishness with which they respond to the most various external impressions, the slowness with which they learn to see—i. e., to interpret their sensations of light—gives rise to the conjecture that in particular their visual sphere, the upper back part of the cerebral cortex, is the most in arrears. The brain of the newly born differs from that of the adult at first view, apart from the smallness of it, in the smoothness of its superficies. It does not, indeed, lack the principal fissures and convolutions, but they are shallow, in part barely recog-

nizable, while the secondary and tertiary fissures are as yet almost totally wanting. Not till the fifth week, according to the investigations of Sernoff, are the accessory *sulci* and convolutions present. The brain of the newborn child is a sort of imperfect model of a human brain in reduced proportions, needing yet a good deal of carving, chiseling, and polishing; and microscopic investigation acquaints us with great differences between the two, in reference to the cortical layer of the cerebrum, which is to be looked upon as the material substratum of all higher mental activity. This is the so-called gray matter of the brain, and it is called "gray" because in comparison with the conducting white or medullary substance it actually looks gray, on account of the predominance in it of ganglionic cells. These it is which, along with their conducting fibers, are still lacking in the newly born, or are present only in very small quantity, whereas after six weeks their presence can be more easily demonstrated. Later, when the brain is fully grown, the number of them amounts probably to several hundred millions.

I by no means intend to assert that the ganglionic cells are the sole or even the chief agents of all the higher intellectual processes; for children without these cells manifest certain signs of mind, and much intelligence is found in animals with very few ganglionic cells. But it is certain that in man these cells

increase with extraordinary rapidity as his mental development increases; and we are forced to attribute to them an important *rôle* in all cerebral functions, perhaps that of assisting nutrition. Possibly, indeed, it is they that effect the fresh formation of the protoplasm that spreads itself, as the intellectual development goes on, more and more in extraordinarily fine fibers, like a network, in the gray substance; and possibly this is the true substratum of the mind, and hence the "seat of the soul."

However this may be, no distinction of the sensations in any department of sense can be supposed to take place without the development of the cerebral cortex; and even when the cortex is superior in quality and the external conditions are the most favorable, it takes much practice to acquire in any department of sense a discrimination of sensations that comes anywhere near the acuteness attained by the ear of the musician. Who can distinguish from one another the various sensations of smell that, in youth as well as in later life, crowd in upon us in overwhelming number? They can not be indicated by language; the child does not learn to name them; nobody is interested to designate for him the agreeable and the disagreeable odors as accurately as tones are named in instruction on the piano. It is the same with the sense of taste, certain sensations of which all through life, as in childhood, are very frequently confounded with sensations

of smell. How common it is for people to speak of foods and wines as having a good taste, which in reality have no taste at all, but simply an agreeable aroma!

Finally, as to the cutaneous sense. For temperatures, in the discrimination of which we are not specially instructed, we have only the few terms, *hot*, *warm*, *lukewarm*, *cool*, *cold*, and must then resort to the thermometer. But for the various sensations of contact and the muscular feelings we have no thermometer; and the terms we use, thrown together indiscriminately, such as *rough* and *smooth*, *hard* and *soft*, *wet* and *dry*, *pointed* and *blunt*, relate much more to combined sensations of touch and muscular sense than to contact alone. As to tones and colors, also, there is a sad neglect of training in discrimination and accurate naming, in the great majority of families.

A number of children in the English schools have been tested in reference to their color-sense, and it appears that an unexpectedly large fraction of them were wholly incapable of telling correctly the fundamental colors which differ most from one another—viz., red, green, blue, and yellow, or of naming the degrees of luminosity, "white, gray, and black," although the tests were easy ones. To infer from this that such children are color-blind would be altogether inadmissible. They are unpracticed; their retina is normal, the optic nerve normal, but their visual

sphere is unpracticed. They know the words that name colors, and they have the sensations of color all right, but they do not know which words and colors belong together. They do not understand their own sensations of color. This is the way it is with the little child. I put color-tests to my child for a series of years. Before he could talk, he was unable to distinguish green and blue as surely as red and yellow, and white and black; and he confounded green and blue with gray, and at a later period he confounded their names.

In regard to their color-sense, all children who have not had special training in this direction show great uncertainty up to the end of the second year, and even in the third year they often waver in judgment to such a degree that they might be supposed to be color-blind. But where this ignorance of colors continues into later life, it is very often the result not of organic defect in the child but of neglect on the part of the parents.

In many respects the case is similar with tones. No child whose organ of hearing is normally constructed is born absolutely unmusical. Here, again, the deficiency in discriminating tones, and sensations of sound in general, may be owing to deficient exercise of the central portion in the brain, particularly of the auditory sphere, which receives the excitations that come from the ear through the auditory nerves,

bringing with them sensations of sound. We can never tell whether a child is absolutely unmusical unless we give him opportunity, and early opportunity, to distinguish tones. Do this, and it is soon apparent whether he is to have a musical ear—a thing dependent mainly on practice—and whether he has a sense for melodies and thus a memory for successions of tones. For he will very early begin himself to sing; often much earlier than to talk, if these natural gifts, favored in some degree by heredity, are strongly emphasized in him. But if opportunity is lacking in earliest youth for the discrimination of tones, if the child has no exercise of his own vocal cords, beyond his babbling to himself, if some heed is not very early given to his hearing, his case may easily be like that of children pronounced to be color-blind who have never been taught to distinguish colors. He will be declared to be without talent and utterly unmusical, when he is not so.

An absolute lack of the musical ear, and hence of ability to distinguish tones of a certain pitch, is always an anomaly, a sort of deafness either inborn or acquired, just as much as the inability to distinguish certain colors is an anomaly. It is therefore to be desired that in schools of little children, unless there are imperative reasons of an external character, no child shall be excluded beforehand from instruction in singing and music, but only in case he makes no progress

at all after a somewhat protracted trial. We can not, indeed, go so far as did the great English naturalist, Thomas Young, at the beginning of this century, when he declared that every healthy human being can learn everything that any human being has ever learned. But that there has been too much neglect in the opposite direction in regard to the development of the senses of the newborn human being, is certain.

CHAPTER II.

FEELINGS, EMOTIONS, AND TEMPERAMENTS IN INFANCY.

BESIDES the five special senses which deal with external impressions, there are, as we know, in the adult human being general senses also, through which we have feelings of the body—e. g., of pain and pleasure, discomfort and comfort, feelings of a general character—in a word, general feelings. The newborn child doubtless brings with him into the world, already developed, the nerves indispensable to such feelings, feelings that are aroused by internal stimulus. For who would deny that the child becomes thirsty through the enormous loss of water in exhalation of breath and through the skin; and that crying, which ceases immediately when milk of the right kind is given him, is a sign of discomfort, and discomfort arising from the need of nourishment? The voice of the little child is, even at a very early period, a different one when he cries from hunger from what it is when he cries from pain. But although such differ-

ences in bodily feelings assert themselves at the very beginning of life, yet a separation of them like that in the adult is certainly far from complete; in fact, during later life no human being gets so far as to separate all his general feelings as sharply from one another, and to designate them by words and signs—such as notes or numbers—as he does in the case of colors and tones, and to locate them definitely in his body as he does the impressions of taste.

I have in mind here not merely headache, neuralgia of the face, inflammations, stomach-ache, side-ache, nausea, from which little children whose health is generally good may suffer like adults, although they can not tell their suffering: I mean also feelings not in the least related to diseased conditions, such feelings as hunger and thirst, satiety and disgust, fatigue and sleepiness. How hard it is to separate the members of these couples from each other in the grown person! In the little child these feelings are yet more like waves pouring over one another, and nobody takes the pains to bring them separately to the child's consciousness, because no one, not even the incorrigible hypochondriac, is really well informed in this department of general feelings.

Meanwhile it is of peculiar interest to the observer to trace the manner in which the sense-impressions that throng in upon the little child in prodigious abundance gradually lead to definite sensations and to

higher feelings connected with these, within the province of the special senses.

We note very early that the foreground is occupied by nourishment. The hungry child is indifferent to everything else until his hunger is appeased. During his greedy feeding, all attempts to divert his attention —it is not till late that we can direct his attention at all—from the gratifying of his demand for food are at first almost absolute failures. And inasmuch as during the first few months hunger and thirst are naturally always appeased simultaneously by milk alone, it is conceivable that here first the faculty of sensuous discrimination is developed to some degree of acuteness. After the weaning from an exclusive diet of milk has begun, the differences in taste of the first kinds of food given are perceived by the child with surprising accuracy. To be sure, the fact that a flavor of salt, a little ginger or lemon-juice is already enough to call forth defensive movements as signs of refusal, does not authorize us to infer the existence of emotions of aversion, disappointment, anger; for even the child born without a brain makes, under the same circumstances, the same defensive movements with just as strange grimaces, and likewise puts out the tongue and shuts the eyes tight. But these gustatory reflexes at any rate form the necessary basis for the later appearance of emotions in the department of taste; gustatory feelings, one might say, which, as we

know, readily express themselves upon the features of adults, and are with difficulty controlled. The case is similar as to differences not to be expressed in words, in the smell of foods—for the infant chiefly in the smell of milk. In this respect the adult human being remains, in fact, for the most part on the plane of the infant all his life long, although the feelings of sympathy and antipathy, evoked by the sense of smell, are often unconquerable, and may play an important part. The olfactory lobe in the human brain is small in proportion (compared) with that of most mammals, and remains backward because the interest in sensations of smell is much slighter in the human than in the brute world. Blind and deaf children have, notwithstanding, a finer sense of smell, presumably, than those who are in possession of all the senses, because, when one sense is lacking, the organs of the others get a better development on account of more frequent use.

The sensations experienced by the little child through the skin fall very early, no doubt, into two well-marked groups: sensations of touch and sensations of temperature. In the first group the chief office is performed by the hands, which are obliged to master a disproportionally greater variety of impressions than are all other portions of the body, particularly the feet. The lips and the tongue are the only parts that might vie with the finger-tips for the pre-

cedence. In sucking, which is the chief occupation of every human being during his first half year, and which, in fact, has given him his name of "suckling," the sensory nerves of the lips and tongue have an extraordinary amount and degree of exercise. Here is the source of the greatest enjoyment, no matter whether the child is lying at his mother's breast or is provided with a nursing-bottle: upon this is concentrated all the incipient intellectual life, and hence it seems natural that new objects, if small and portable, should be put into the mouth, or at least brought to the mouth, as soon as the child can seize with sureness, after the lapse of the first three months. The temperature of the object touched is, however, of great importance here. If milk is but a little too cool or too warm, it is refused. If the water of the bath is a single degree cooler than usual, or if it is considerably warmer, then the child, who is unfortunately too much spoiled in this regard here in Germany, screams as if a wrong had been done him, or as if he were frightened, and he may very early make movements of desire that leave no doubt of the existence of unpleasant feelings caused by too great coolness or warmth.

Nevertheless, it is not possible to determine with certainty the date of the child's first emotions proper. Comparatively the easiest to investigate in little children, with reference to their physiognomic expression and their psychogenetic significance, are *fear*, in its

two forms of anxiety and fright, and *astonishment.* It is instructive to compare with them the corresponding states in animals. When the bird-dog is astonished at the flames the first time a fire is made on the hearth in his master's room, or when he is terrified by the bursting of a soap-bubble floating in the air, or when he wonders at the movements of a fan, which seems to vanish on being clapped together and to appear again when opened, he is in the situation of the little child in whom that which is incomprehensible (in a literal sense, that which can not be grasped or prehended,) arouses astonishment; but the difference between the human being and the brute is, even at this early stage, an immeasurable one. For the first astonishment of the child leads on to the careful consideration of a countless number of sense-impressions, each one of which gives to his little brain a special stamp, as it were; and later these all combine, as memory-images, to form new thoughts. The brute, on the contrary, stops at simple astonishment, and this is speedily diminished with repetition of the same impression. Even the child of completely normal development is certainly dulled by repetition of similar impressions: these lose the stimulus of novelty that excites astonishment, but not without leaving behind them memory impressions that continue to be influential; and the older the child, the more do impressions of another kind, which are far

too subtile to be noticed by a brute, produce the most enduring effects by exciting the child's astonishment. For instance, wonder is caused by the sight of a lame beggar who has fallen in the snow and is receiving help from a stranger, or by the feeding of an animal. Through such experiences not only is pity stirred, but in some children the foundation is laid for some virtue, like benevolence, generosity, unselfishness, after the original astonishment has been overcome. On the other hand, wonder at simple—but to the child unintelligible—phenomena, such as the flying of a bird, the creeping of a snail, the falling of a plaything from the table, the rebounding of the ball when it is thrown against the wall, must arouse the activity of the intellect. The search after the cause of the unintelligible falling when the ball rolls off the table, and of the equally incomprehensible bounding when it is thrown from the hand, continues with many children for weeks, and even for months.

This school of astonishment every human being must go through for himself. A child incapable of wonder, not dull, though supposed by superficial judgment to be so, yet not originally endowed with sensibility to the degree common in youth can not under any circumstances be expected to have a normal intellectual and moral development; for it is owing to astonishment, ultimately, that a new impression of sight or sound, and in less degree an impression of touch,

temperature, smell or taste, acts very strongly on the sense-mechanism concerned. The sensation brings in its train unusually keen and lively feelings. These feelings are manifested in the case of astonishment by fixed, wide-open eyes; at a later period, by raising of the eyebrows in addition; often the forehead is wrinkled, the mouth opened, the whole body motionless, the arms retaining exactly the same position as before the impression was made, while there is a silence that would be called "speechlessness" if the infant were capable of speech. When this image of astonishment is exhibited by a child at insignificant things—phenomena long since become indifferent to grown people—the parents have reason to be glad of it.

This phase of psychogenesis ought to be reached in the second quarter of the first year, or at latest toward the end of that period. If it comes much later, or not at all, then the after development of the intellect must also be abnormal, because all our knowledge is matured through our sense-impressions; and when these are deficient, there is an irremediable lack, just as when the excitability of the nerves of sense is inferior or wanting.

Fear, too, is one of the mightiest teachers during childhood; and if it were not too often called forth by ignorant nurses and maids needlessly and unwarrantably, just for entertainment, with no educational purpose—by the pretense of "the black man," by shutting

up in a dark room, by sudden seizure from behind, and the like—assuredly a much larger proportion of people, and particularly of women, would be less easily thrown into a fright at trifling occurrences than is the case now. A distinction is to be made between inherited and acquired fear, both of which manifest themselves in the child by the same external signs. For when an invincible antipathy to certain animals—e. g., pigs, cats, dogs, and even doves—shows itself at the first sight of them, in the fourth month of life, in individual children, it is not easy to show how this fear can have been acquired. The child does not know that there is danger, and yet he is afraid. A little later he will tremble, grow pale, draw down the corners of his mouth decidedly, cower, cry out, or make movements for flight, at seeing and hearing a steam engine, the shrill whistle of which is of itself enough to set many an infant into a fit of screaming. This effect can not be the result of education any more than can the fear of falling the first time a child tries to walk alone, or the dread of the ocean—a fear that persists even when the sea is smooth and almost noiseless, at the ebb.

Timid and affected mothers have timid and affected children, for the reason that their own behavior, their frequent startings, outcries, flights, are imitated. In like manner courageous mothers have courageous children, because by their own conduct they exert an edu-

cational influence; and here, as in all departments of education, to be an example is of far more worth than to give good instruction or to reward and punish. But there are children who of themselves, apart from any influence, good or bad, of those nearest to them, are easily frightened; and there are others who are hard to frighten. Timidity depends on temperament, and temperament, through the excitability of the nerves of sense and the capacity of the central nervous organs, determines substantially whether the impressions received by the organs of sense shall persist for a long or a short time, with intensity or with less tenacity.

These varieties of aptitude and of organic memory are the basis of the distinction I have elsewhere discussed in detail (in my university lectures) between the four temperaments—a distinction that was made nearly two thousand years ago—the different temperaments being classed as the sanguine, the choleric, the melancholy, and the phlegmatic. These may be discerned very early in the great majority of children—in the second quarter of the first year, beyond a doubt. But external circumstances may have much more effect than at a later period in the adult in causing the amalgamation, as it were, of one of these temperaments with another, so that the one may, to a greater or less degree, make good what is lacking in the other; and for this reason the ultimate character of the mature man can never be predicted from the behavior of the

child in the first three years. "Just as the twig is bent the tree's inclined," is doubtless true, but what we are concerned with here is the period before the bending. And it is of practical importance in this matter to know that the four temperaments, which have for a long time been accepted without any one's being able to say why, may be distinguished in advance quite naturally on physiological grounds. In two of them the excitability, and therefore the sensitiveness to impressions of various kinds, is great; in two of them it is small. The first is the case with the choleric and the sanguine, the second with the melancholy and the phlegmatic. Again, the duration of the after-effect of every impression, the tenacity with which the memory-image is retained, is, in the melancholy and the choleric, surprising, the organic change in the brain accompanying it being probably considerable; in the other two, the sanguine and the phlegmatic, this effect is slight. Thus we get the following classification, which is especially to be borne in mind in our judgment of the child no less than in our judgment of the growing youth, in connection with education, and particularly in the forming of character and in instruction, both physical and intellectual:

	Excitability.	After-effect.
Sanguine	Great.	Small.
Phlegmatic	Small.	Small.
Choleric	Great.	Great.
Melancholy	Small.	Great.

Considering the numerous transitions from one temperament to another, the connection between them all, and the difficulty we find, in spite of the perfection attained in the art of physiological experimentation by means of measure and number, in maintaining distinctions in quantity and degree, this view can not, of course, as yet be established physiologically in its details. I have rather come to it through observation of men in the world and of little children in the nursery. It is at least of value in judging of the child's *naturel*, and of his intellectual development as far as that can be foreseen.

An uncommonly lively child, who turns his head at every noise, moves his eyes restlessly, directs his attention now hither, now thither, cries a good deal, and when he learns to walk does not stay in any one place more than a few moments—a child, i. e., of decidedly sanguine temperament—ought to be guarded carefully against unnecessary stimulation. He should be accustomed to moderate light and to stillness, and from the beginning should not be noticed by members of his family, and by other children, as much as his opposite, the child that is slow, that takes little or no notice of his surroundings, but sleeps much and uninterruptedly for a long time—the phlegmatic child. What would, in the case of the former of these children, lead to an aggravation of his mobility, to convulsions and other disturbances of development, is just

the thing needed in the case of the latter, viz., frequent change in his plays, stimulation by means of light and sound, much cold air and cold water, in order that his natural heaviness may be to some extent combated.

Now, as to the choleric child. How important it is for the mother to know that a boy who, when very young, without sufficient cause goes into violent fits of passion, in which he strikes out with arms and legs or stretches himself out rigid and stubbornly inflexible, frightens his mother by a congestion that announces itself with an alarming flush of the skin of the whole scalp, ought not to be treated with violence or blows! Such a child in the moment of extreme rage should be left alone, and be observed, without his knowledge, from a neighboring room. When a child in such a state of excitement gives notice of the coming on of one of his "spells," by shutting his eyes firmly, "squaring" his mouth and uttering most disagreeable screams, the best thing is to leave him at once to himself upon a blanket on the floor of the room. Often he will become quiet in a surprisingly short time in the absence of other persons, whereas all well-intended attempts at consolation are likely to call forth a fresh outbreak of passion. I am acquainted with many cases of such screaming children of genuine choleric temperament, who by means of rational training have been entirely cured of this fault.

Sometimes, unfortunately, children by no means disposed to such abnormal freaks are transformed for the worse by inexcusable fault on the part of the members of the family or of nurses. For example, a child quietly sleeping is waked in order to be fed; or is allowed to cry uninterruptedly in the night without being once looked after to find out what is the matter with him; or he is swathed too tight. Not only is the physical development disturbed considerably by such preposterous actions, but the character, too, which unfolds itself very early, is spoiled. The waking of young children, in particular, I regard as extraordinarily harmful in both these directions. Children wake after proper rest, on account of hunger, and almost invariably give notice of the fact by their voice, no matter what temperament they are of.

It would not be difficult to make out a full list of simple principles of training for the first year of life, upon the basis of the varieties of temperament as here indicated; but I have to pursue the development of the child's mind in another direction, and therefore must dismiss this matter here.

CHAPTER III.

THE FIRST PERCEPTIONS AND IDEAS.

In contrast with the first period of life, there appears in the child, after some months, a keen discrimination of many kinds of contact, of different temperatures, and (by means of the muscular sense) of various degrees of pressure. The warm and wet, the damp and cool, the dry and warm, the dry and cold, the rough and hard, the soft and smooth, the heavy and the light—these and other distinctions are now felt, as may be seen in the child's actions when he avoids or seeks things, and in his countenance, the expression of which can not be described, and is hardly to be reproduced in picture.

Psychologically considered, this discrimination in the sense-impressions is the more important, in that it is attained at a time when as yet the child gives no hint whatever in the direction of naming his feelings in words of articulate speech. The intellect has already developed to some extent without any regard to words at all, even to words heard from other per-

sons; for deaf and dumb children do not differ essentially in this respect from normal children in the first months. But that the intellect is really active in the discrimination of all these sense-impressions is proved by the ordering or arranging of them in space and time.

The first act of the human intellect consists in the ordering of the impressions made upon the organs of sense—upon the skin first, and then upon the eye. When the simultaneous impressions in all departments of sense, which form the raw material of all experience, are arranged with regard to their relations to one another—i. e., their differences, along with complete likeness in kind and degree—we call the result *space*. The intuition of space is so firmly grown into our brain that we are quite unable ever to get rid of it after this ordering activity has once begun. Even in the most profound derangement of mind this function persists. Two impressions of light, equally bright, of the same color, just alike in form and received at the same time, are distinguished in all cases only by their locality. Things show themselves to us ever beside one another, above one another, or behind one another. No fourth location exists, except in thought. We always find a difference in our own body between left and right, above and below, before and behind; and even in the sphere, on the surface of which all points are alike, we are constrained, how-

ever often we turn it, to recognize just these three dimensions and these three only, by virtue of our inherited organization.

These relations of space the child learns—learns through his own experience exclusively, through failures in seizing objects, through errors of vision, through hits, falls, movements of the eyes and head, and through the perception that objects become brighter or darker as they are near or distant. In this way, and by degrees always, does the great difference become plain between a surface and a solid body that is too far off for him to touch. The question, so much mooted by philosophers for two centuries, put by Molyneux to Locke—whether a child born blind, but receiving sight by means of a surgical operation, would be able at once to distinguish a sphere from a cube by the eye alone—was indeed correctly answered in the negative, but not on satisfactory grounds. It was assumed that the difference between these objects would be learned, like the difference between a flat plate and a globe, solely through the sense of touch; and the inference was made that in looking at different forms the perception of differences of form comes only through the recollection of the sensations of touch. Correct as the assumption was, the inference is not satisfactory; for a great many forms are cognized as different by the eye alone, where there is no possibility of employing the sense of touch. The rainbow

can not be touched, nor the moon, yet they appear round to the child very early—the first flat, the second spherical in the telescope; and to assume that both kinds of roundness are possible for him only through the remembrance of round things touched, as balls, must be called far-fetched, at least. As children born blind and never acquiring sight learn to distinguish differences in the form of bodies, so children with normal vision can equally well perceive the inaccessible heavenly bodies, and far-distant objects on the earth, as differing in form, merely by the sense of sight and the practice that goes with it.

The retina of the eye is a skin, too, and of a sort in which the nerve-endings are much more closely crowded together than in the ordinary skin. Although objects do not touch this visual skin, it comes in contact with the vibrations of ether that go out from them, which we call rays of light merely because they produce the sensation of light. How nearly related sight and touch must be in the child's mind is manifested in this, that little children, at the time when they are learning to seize objects, often carry new ones, grasped for the first time, not to the mouth, but, strangely enough, to the eyes, as if they wanted to put the things into the eyes, or into one eye. Through the combination, then, of tactile and visual impressions, as well as through the separation of these from each other, the space-intuition is acquired,

slowly, gradually, as little by little the fact becomes manifest that for all the senses it is one and the same space in which the impressions are co-ordinated.

What the chicken just out of the shell can do dexterously—viz. pick up a grain of corn, seeing it at once in its right location—this the child must take several months to learn. With the animal, as soon as it comes into the world a completely developed nervous mechanism begins to act. In the human being the mechanism is not yet complete, but requires impressions from without that it may be perfected. Thus we see that the two contending parties of nativists and empiricists—the first regarding all space-intuitions as innate, the second maintaining that these are acquired by experience—are both in the right. For in the creature that sees well from the start but can not learn to see much better in later life, the nervous visual apparatus is on hand, innate; on the contrary, in the being that is learning for years to see better and better, this apparatus is at birth incomplete, not ready made, exists in part, as a potentiality simply, but is extremely plastic, and is in fact less the peripheral eye than it is the cerebral tract belonging to that —the later visual sphere, or area, where the retinal images are interpreted and the elements of the future intuition of space are collected together. This portion of the cerebrum, which the physiologist Hermann Munk, of Berlin, first understood in its true signifi-

cance, after years of experimenting upon animals—this tract, the destruction of which produces blindness, though the eyes may be uninjured, is not developed in the newly born human being as it is in the chicken. The newborn child is mind-blind—I might say "space-blind." He has a sensation of light, but he can not see, can not perceive anything in space.

The ear contributes very little to the development of the space-intuition; it is the organ of the time-sense. It discriminates with marvelous accuracy, when practiced, to the two thousandth of a second in tones. But in effect all the organs of sense are organs of time, only that they are less perfect ones. Two sensations belonging to different departments of sense can never come into consciousness at exactly the same time. Never simultaneously, but only successively, can two impressions on precisely the same place in a sentient surface be perceived as such. Two stars represented at once on one retinal element appear as a single star, even if they are millions of miles apart; two simultaneous needle-pricks on the same spot of the skin appear as one prick; and so of all the senses. But if two equally original, simple, pure sensations—two lights, two tones, two pricks, in one and the same place—are apprehended as twofold, then the child apprehends one of them *after* the other, *before* a third, in the place where the impression is made, be it the surface of the skin or the field of vision, or the field

of audition—i. e., the difference between them is *time*. But when this takes place the child has had not merely a sensation but a *perception*. The very young child has no time-sense. This begins to develop with his first perception. Perception differs from sensation essentially in the accession of the spatial and the temporal. "I perceive something," a thing, an occurrence, means, strictly speaking, "I have co-ordinated a certain sensation, sharply, clearly, perfectly defined from every other, with reference to space and time." The place of a luminous point, the direction of a line, the extension of a surface, or of a body that the child distinguishes from a mere surface by feeling of it, the changing of the place of a point, of a line, of a surface, or a body—in a word, *motion*—all these results of the co-ordinating activity of intellect make out of sensation a constituent part of higher cerebral activity which necessitates the development of mind.

But with bare perception of the things that present themselves continually about us, and to us, and in us—in such variety and abundance as not to be mastered—the chief step in knowledge is not yet taken. And although the child in his first months in regard to the most of his sense-impressions does not go beyond mere perceiving, any more than does the brute, yet in the case of some of his impressions he is very early led to the further step, necessary to

all higher intellectual development, which first makes the perceptions available for thought, the highest function. This step is the search for the *cause* of what is perceived. For example, after a green oval surface has been seen on the left, above, in the field of vision and at a certain moment—i. e., has been perceived—then little by little appears the higher function of the brain, through which the leaf of a tree is recognized as the cause of this visual perception. Now the perception becomes an *idea.* A sensation defined as to time and space—i. e., a perception which becomes through the accession of the cause an object of knowledge—we call a representation, or an idea, or a thought. Ideas are the exclusive contents of the whole higher intellectual life. The combination and separation of them is the work of thought; the origination of them is the product of experience and hereditary endowment, and of the imagination that is dependent on both; the destruction of them is the consequence of failing memory.

"I have an idea of something." This sentence denotes the act of assigning a cause for my perception, no matter whether this cause is demonstrable or remains a pure product of the imagination. The fact that an idea is suggested again and again by experience is not a reason for its being correct, and no province of observation is more instructive in this respect than the very one that comprises the mental

activity of the child, because here we find more easily and more frequently than elsewhere in human life the errors made in the search for the cause. A number of examples of this have been given by me in my book on "The Mind of the Child"; and I will here simply remind the reader of the well-known trick practiced by mothers and nurses, of blowing with the breath upon the place where a child has hurt himself. The pain passes off, and the child, who regards the blowing as the cause of the betterment, will afterward blow even when the place where he has been hit is the back of the head, where the current of air can not possibly reach. That the pain ceases in both cases is purely the consequence of the suggestion that it is gone. On this is based one of the most important principles of education, one that concerns the control of the child's ideas. I like to call it the "Principle of Diverting the Attention."

This principle, highly important in all mental development, is in the time of greatest sensibility, in earliest youth, decisive in its application. For in the bright mirror of the child's mind good and bad images are certainly produced easily by the mother; and although both kinds are partially obliterated in the course of further development, yet they persist for a longer or shorter time, according to the strength of the suggestions of the separate ideas implanted or co-ordinated, and according to the power of memory.

"Suggestion" is not quite the same thing as inoculation or persuasion; these words give the meaning only partially. The special characteristic of the suggestive method is not the persistent introducing or impressing of a certain train of thought alone, but above all the associating firmly with this of an occasion for doing or not doing some specific thing. It has been spoken of in detail by me on other occasions, because suggestions play a great part elsewhere also, and their chief importance is yet to appear, particularly in the practice of medicine. We are at present concerned with the determining influence of the suggestive management of the child in the first period of life.

It is, to be sure, impossible in the intellectual development of a child, even if one were to try by means of punishment, to do away with the three previously designated elements—time, space, cause—or even to alter them by persuasion; but it is very easy to connect wrong names with them, so as to make confusion. If any one were disposed, for example, to exchange the names of the points of compass and to teach the child that east is west, the child would still learn to point out correctly the quarter of the heavens in which the sun rises, but he would name it wrong. If such senseless attempts were continued, he would become uncertain, not so much in the use of his intellect as in the use of his memory in the selection of words and signs. It is much the same in the domain of morals. If from the

beginning false ideas as to mine and thine, the permitted and the forbidden—i. e., right and wrong—are given to the child, as is unhappily the case too often, through ignorance, then his moral ideas become wavering. And it is frequently found to be no longer possible, in later life, to repair the damage completely, because a strict self-education can not be attained without previous education through others. For this reason I have always lamented that in cultivated families the children should be left much alone with uneducated nurses, maids, *bonnes*, unless the educated parents occupy themselves with the child to the same or a greater degree in order to furnish the requisite counterpoise. The fathers have other claims upon them; the mothers are in too many cases hindered by so-called "duties" of society, or by needless journeys.

When a child grows up from the beginning under the influence of the suggestions of cultivated people, he must take with him, into the period in which the nursery is left behind forever, a considerably less number of naughty ways and a great many more excellences. He will then, of course, be able to offer less resistance to the later endeavors of his trainers and teachers than if these naughty ways had first to be unlearned, and these excellences, such as obedience, had to be bred in him afterward. The greatest defect in our European education at the close of the nineteenth century consists in this: that in the first

period of the life of the young there is far too little physiological training, and at a later period far too much unphysiological instruction. And yet it would be possible, by means of an extended and systematic use of the principle of diverting the attention through suggestions without words, to prepare, even in the period from the end of the third to the beginning of the tenth month, for the subsequent education through words, so as to give a prospect of permanent results. To do this we must carefully and perseveringly repeat, at fitting times, those suggestions that are helpful toward harmonious development. On the other hand, unphysiological means of quieting and of amusing are to be strictly forbidden. For instance, the inexcusable violent rocking in the cradle and baby-carriage, which puts the babe into a dazed condition, in order that he may not trouble those that have the care of him, is extremely injurious. The brain is slung this way and that in the skull, which is still open at the top; yet if a grown person were to be tossed about in his bed to quiet him, as I have often seen children rocked in cradles and baby-carriages, he would indignantly resent such rough treatment. This is not the place for going into details concerning the earliest suggestions of a wholesome sort, such as occupying the attention of the child, when it is unoccupied or improperly occupied, by rubbing with a warm, dry, soft, smooth hand, by exercising his senses little by little without

wearying him; and, further on, by kindly but decisive language, by looks and gesture or a significant glance. I desire now simply to indicate the great importance of this principle of education, which is indeed much employed but not systematically enough in general—the diverting of the attention through suggestions.

Nowhere does it recommend itself more than in the play of children. A satisfactory theory of play is still wanting, and yet a man does not learn through any kind of instruction or study in later life anything like so much as the child learns in the first four years of his careless existence, through the perceptions and ideas acquired in his play. What seems to adults unworthy of the slightest attention in childish play, is to the child himself of the highest significance, because it has the charm of novelty. A piece of wood, strings, nutshells, utterly worthless things, like pebbles, leaves, or the contents of a waste-paper basket, acquire a great value through the extraordinarily lively imagination of the child, which transforms bits of paper into cups, boats, animals, and men; and as I have previously spoken of the experimenting of little children as play, I may now mention the internal resemblance of their procedure to that of the naturalist.

When the great Newton was asked how he had ever managed to make the extraordinary discoveries with which he astonished the world, he gave the answer, since become famous, that he seemed to himself

to have been only like a child who had been playing on the seashore and had had the luck to find now and then a smoother pebble or a prettier shell than his playmates. That he had worked, had been restlessly, intensely active, had combined, and analyzed, to the great neglect of his health, to forgetfulness of his meals—of this he said nothing.

We easily overlook in like manner the great intellectual strain connected with the early play of children. How much there is of combination—i. e., of putting together! how much of analyzing or taking to pieces of tangible things! how much of construction and destruction! how much investigation, persistent penetration accompanied with great muscular effort, into the interior of things that are shut up! The passion for unveiling the veiled, for getting at the concealed, for finding the reason why things hold together, the cause of a noise, the cause of an effect of light—in a word, the insatiable, hereditary appetite for causality in man—this it is which finds its first satisfaction in childish play. Hence come feelings of pleasure, and the removal of the discomfort occasioned by ignorance. But what else is it that urges the thinker and investigator in all departments of science to his self-forgetful exertion? If the pain of hunger and thirst has at all times induced men as well as beasts to get rid of these disagreeable consequences of the lack of food, so, too, at all times the discomfort at-

tending the lack of knowledge—that is to say, the longing to still the unconquerable hunger for causes—has urged children as well as adults to a higher, an intellectual labor. The fact that this kind of labor leads to victory in the struggle for existence more surely than does mere physical activity, is not at all a conscious motive in the matter.

Play makes the child happy: work makes happy the learned man. By such a parallel the value of the activity of the learned man, or better, of the investigator and thinker, the discoverer and inventor, is not in the least depreciated. We simply put a higher estimate on the activity of the playing child, who in his primitive fashion likewise discovers and invents. He concentrates his attention for a long time on one and the same object; he can busy himself for half an hour with a rudely carved horse: on the other hand, he desires change of activity, after which he will go back to his former occupation, which no longer offers him novelty, but remains attractive in his remembrance because it was once new. As early as the first half year, the *naturel*, the particular nature of the child, is distinguished by such individual differences. But what a schooling the child goes through in his play, in one or the other of these ways of acting, has not yet been by any means investigated psychologically. The children of poor families help themselves out by means of natural products that cost nothing, and of

the ruined toys of the richer; while the children of the rich have at their disposal the most costly machines, models, whole arsenals of weapons, museums of dolls with houses to live in, shops, and the like, in a superfluity that is not justifiable. The toy-shop profits by it, not the child. The child that grows up amid a superfluous abundance of playthings easily becomes *blasé* and dissipated; at any rate, he is not any more happy than the peasant child who has small provision made for him, but lives more in the open air. The regulation of the activity of the brain demands, precisely in the first years, a careful sifting of the playthings to be put into the child's hands. It is utterly absurd to choose always "the newest," and it is better to make a selection of a few playthings or games that are suited to the understanding of the little one, than to heap up indiscriminately all sorts of gay, noisy, fragile, and speedily useless toys on big tables at Christmas eve. People do consider, to be sure, whether the colors of the bright playthings are or are not poisonous; but few persons reflect whether the mind of the little child may not be harmed by overexertion in his imitation of the occupations of adults. The child should not be distracted, his energy should not be dissipated; but he should learn betimes to exercise that function of the brain which is most important for his later life, that of directing his attention, of his own motion, persistently toward

a definite end. This he learns far better to do by means of thoroughgoing occupation with two plays than by the rapid alternation of many, which easily confuses the mind and spoils by satiety the *naïve* joy in the simple.

There is, further, in regard to play, the necessity, even in the case of the smallest child, of taking into consideration the influence of the play upon his character. Give him opportunity to find out how things are, for himself, without too much correction or help, through searching and trying, pulling and turning the parts of his miniature world, and we give him opportunity not only to strengthen himself in a measure by his own experience, to develop his judgment through the exercise of his senses, but also to obtain a personal conviction as to what is true and what is not true, instead of echoing thoughtlessly an opinion not his own. Every step he takes on this road is worth far more to him than the corrective ideas too often forced upon him at too early an age. For that which one has seen for himself usually impresses itself more deeply than what one learns from others; and the old proverb, "Bought wit is best," has special force in application to the play of children. A mere command to let this or that alone has by no means the lasting effect of a single experience of one's own. When my child had a single time put his finger into the flame of the candle he never

allowed that thing to happen again; whereas, before this, the taking away of the burning candle when he was attracted by it, only strengthened his desire for it.

Children ought not to be disturbed when they are playing harmlessly, without imperative reasons. They should not be hindered by too many well-meant good precepts from teaching themselves through their own perceptions. This self-teaching not only enriches their knowledge and augments their ability, but forms their character, particularly when there are several children together and one of them shows himself superior to the rest. Still, this influence of play does not make itself felt until a later period, which I will not now consider, for fear of being too diffuse.

Before that period arrives several important phases of the development of the child's mind are to appear. The will manifests itself after the first clear ideas of movements have been formed, and the origin of that is now to be explained.

CHAPTER IV.

THE ORIGIN OF THE WILL.

THE human will is the greatest power on earth. It can not, indeed, oppose a direct check to the rude force of Nature, but it can raise itself above this, and enable man to be prepared for everything, so that he is not taken at unawares by sudden misfortune, death, or destruction. The ancient saying, that spirit rules matter, applies, above all, to the power of the human will, which removes mountains, joins oceans, overcomes distances on the earth by steam and iron, and cosmic distances by putting itself into communication, by means of a ray of light, with the most remote heavenly bodies. It is man's will, too, that shapes his destiny. His career in life is determined chiefly, not by accidental circumstances, by environment or by education, but by his own will. Is he weak, does he submit to the will of another, then he lacks self-determination; then he should not be surprised if he does not get on according to his notion, but goes like the ball that is thrown. "Man makes his own destiny,"

and "Every man is the founder of his own fortune," only through his own will.

Hence it is of fundamental importance, and is profitable in a practical point of view, for every one to know how the will originates, is developed, and is perfected.

A greater contrast can hardly be imagined than exists between the babe, which lies absolutely helpless, without will or intellect, and the man into whom it is transformed—the man in the prime of life, in the thick of the contest with others, growing stronger and stronger, and possessing a firmly established character. Nevertheless, it is not merely a possible thing to observe the metamorphosis, step by step—as in the province of morphology we have accurately traced the changes of the germ slumbering in the egg up to the hatching of the fowl, which, unlike the egg, is a creature having motion of its own—but numerous observations have actually been made in this direction.

In order to discover the origin of will in the child, we must first of all know how will may be recognized. Now, the only sign of will that we can find is muscular movement. It is by movements solely that the child can manifest his will. Yet he makes lively movements before he has a will; therefore we must inquire into the difference between willed movements and those first movements that are made without will. In order to do this we must look to the causes of the

movements, must ascertain which among the great number of causes are absolutely lacking in the earliest period, and are then separate from all others because they bring after them the voluntary movements of the child. Now, the causes of movements that lead gradually to the development of the child's will are ideas, and first of all ideas of movements.

It is therefore very important to make an accurate classification of all the movements of the child, in order that we may separate from the others those arising from ideas. A division merely into voluntary and involuntary movements is of no advantage, for the very thing to be found out is how the voluntary come forth out of the involuntary. That the voluntary movements exist from the beginning is no longer maintained by any one. The newborn child has absolutely no will any more than the unborn; yet, like the unborn child, it makes numerous aimless, purposeless, irregular movements. Symmetrical muscular contractions of a remarkable character likewise appear when the child stretches and bends its arms and legs, when it sucks, and when at a sudden noise it winks its eyes. Next come expressive movements—pouting, smiling, wrinkling the forehead, and many others. Not until much later—viz., in the second quarter of the first year—begin the first attempts to imitate these movements, the attempts being preceded by imperfect efforts to respond inarticulately to friendly approaches;

last of all come movements that may be regarded as the result of independent deliberation.

Where, now, in this long succession of manifold movements of the child, which are developed for the most part imperceptibly, is the inner, common thread that binds them all together? Scientific investigation, ancient or modern, does not explain the connection and the variations of all the movements of the child; these resemble very closely the movements of young animals. Yet light must penetrate the dark labyrinth if we only hold our attention firmly upon the direct cause of each separate movement. And small as are the results thus far, in a chemical, physical, or psychological point of view, still it is certain that, physiologically considered, all the causes of the child's movements are either external, lying outside the body, or internal, arising within the body. All human movements arise either from external stimulus or internal; the stimuli are either hetero-kinetic or auto-kinetic.

The remarkable—and for the newborn child and animal specially characteristic—manifold, convulsive, stretching movements, accompanied by spreading of the toes and fingers, commonly witnessed in the warm bath; the frequently slow but sometimes rapid bendings of the limbs in a warm bed, and many of the numerous grimaces that at the beginning of the child's life delight the relatives, but on the child's

part are utterly devoid of purpose—these can have none but internal causes. Just such convulsive movements of the limbs are made by the marmot awaking from its winter sleep, and by the chicken developing in the egg that is being brooded, as may be observed under proper illumination. The human being before his entrance into the world is in the condition of the animal in its winter sleep—birth awakes him. The movements made during the long repose of his brain, at unequal intervals, are *impulsive*, like the first movements of the limbs after birth; and these it is out of which the later voluntary movements are formed, by slow degrees at first, and through a process continued for months, of separation, combination, adaptation, and co-ordination.

But other building-stones yet are brought to the erection of the solid structure of the willed movements. For example, when strong impressions are made on the child through the senses, he makes inherited defensive movements, in which the brain has no part. If light too bright reaches his eye, the pupil at once contracts, as I have already said, and a closing of the lid takes place at a flash of light or at a loud report. If a substance of too bitter taste, like rhubarb, is put upon his tongue, he makes movements of retching; and on being dipped into cold water, he draws deep breaths and utters cries. Other reflex movements might be enumerated, common to all children the

world over—movements subject to well-known laws, and occurring with machine-like precision, the cause of which always lies outside the body. The reflex movement follows directly upon the external stimulus, and in a uniform manner. And not until the stimulus is too powerful are general convulsive movements added to these. Here we have a typical example of involuntary movement. The *reflexes* take place without the participation of the will, even in the adult human being, up to the end of life; and when he wills them they are no longer reflexes. The best actor is not able to make voluntarily a reflex movement so quickly and accurately, to begin and end it with such almost infallible precision, as the child that as yet knows no dissimulation.

A third kind of movements is likewise absolutely involuntary, but far more complicated than those mentioned. It comprises the expressions of *instinct*. Instinct is inherited memory. What one's ancestors for an inconceivable series of generations found especially useful and valuable for the preservation of themselves and those belonging to them, they preferred: so that among the defensive and other innate reflexes certain movements were more easily inherited than all others, simply because they occurred far more frequently. The instinctive movements are also distinguished in many cases from all other childish movements by their complete co-ordination and their consecutive charac-

ter—one might almost say, by their logic. The most instructive example of this is presented in the act of sucking, which is by no means purely reflexive, as it is frequently declared to be. It is a movement that is made only when the child is in a particular mood; is not made when his appetite is satisfied, sometimes not if he is fretful, not if he is sick; and it is the most useful movement that the child can possibly make. Choice, however, is not at all involved in it; children born without a brain suck just as normal children do. I have myself seen this. Meantime, such instinctive movements are of the greatest importance for the future development of the will, because they lead early to the inhibition of reflexive movements. A child actively engaged in sucking at good milk does not observe that he is touched, whereas he may previously have made violent defensive movements when touched in the same way. When a strong impulse presses to the front, weaker impulses can no longer possess the motor influence they otherwise have.

This principle finds confirmation in the investigation of a large group of childish movements—the imitative; for, when a child begins to imitate what is done in his presence, he must have in his mind, before he executes the movement of imitation, a more or less distinct image of that movement—i. e., a motor idea. Accordingly, the cerebrum must take an active part, and must be free from other ideas. A brainless

child can not imitate anything; neither can the newly born, because his cerebral cortex is not yet developed. Some deliberation, however short, must interpose: "How shall this movement be made?" Therefore the attempt succeeds only when other motor ideas do not mingle themselves in, to cause disturbance. But in this case a certain degree of will is already attained; a separation of ideas has taken place, and a combination of the motor ideas that belong together, which is required for the excitation and contraction of just the muscles needed. Finally, there must be prior adaptation, with the first successful attempts at imitation, otherwise the act seen would remain, as in the first months, beyond the reach of imitation. Hence, in the conjunction and competition of all possible movements, impulsive, reflexive, instinctive, or other, the first successful imitative movement is a sign that at length an idea prevails as the product of deliberation. Will is here. The first movements imitated by the infant with manifest purpose are usually movements of expression.

From this very brief presentation of the most important elements in the development of the will, it appears that will depends chiefly on ideas, and hence on perceptions that are understood, and which on their part have been formed out of sensations. The impulsive movements and the reflexes come into existence without antecedent ideas; so, likewise, the

original instinctive movements of the child; but never the first imitations. It is plain, therefore, how extraordinarily important it is for the earliest education, to allow definite sensations, perceptions, and ideas to be experienced by the child, to permit him to practice definite imitations, and to keep away from him other ideas that are unsuitable, pernicious, destructive, first to the child himself and afterward to his kin. On the forming of the will depends well-nigh everything in the earliest education; and if I have declared that the education of the human being begins in the first hour of his existence, it was in this sense I said it. Will is not at that time present, but we know that it is one day to be present, as surely as we know that every healthy newborn child will some day talk. But the will does not grow out of nothing. Consequently, we are constrained, in the interest of the newborn human being, as well as in that of his kindred, to direct the will while it is in the germinal state into quite definite paths, and therefore to regulate the external impressions. In this consists the principal problem of education in the nursery; and precisely in this is the greatest failure made, because women—with whom, in Germany, the child has almost exclusive intercourse in the first period of life—do not themselves possess the requisite pedagogical experience and knowledge. How in detail the innate reflexive movements; how the hereditary, but not in-

nate, instinctive movements, to which, e. g., walking belongs; how the first imitations, together with the primitive, always innate, animal-like, impulsive, purposeless stretchings and bendings, work together in order that the voluntary movements may finally come to their right unfolding, can not yet be exactly told. But we have at least found the way that leads to it. What the important thing is in directing the germinating will of the child without breaking it, is easy to say but very hard to carry out. The young trees in the nursery must be bent, not snapped, when they are hindered by external influences from growing straight; and no service is done the little child when from the beginning the natural unfolding of his will is made difficult by unnecessarily strict prohibitions and commands, the reason of which he is wholly incapable of comprehending. This is just the way to foster one of the most undesirable qualities of character, viz., obstinacy. When, on the contrary, in the very earliest period, the educator (or rather educatress, for men have little to do with infants) forbids nothing without a sufficient reason and gives no needless commands, then there arise in the child more motor ideas that do not come into contradiction with the forbidden and with unpleasant commands. Thus the child's natural disposition comes out more purely in his movements, in acts and even little deeds of heroism. And that in the present age of miseducation

it is in the highest degree desirable not to train so much, but instead to let the natural development perfect itself in a manner more in accordance with physiology, will hardly be denied. Physiological education, however, rests chiefly upon taking into consideration the physical substratum of all intellectual activity, the central nervous system. In order to be able to direct the will, one must control the motor ideas of the child. In order to lessen or abolish the tricks of training that hinder the natural development, we must watch not only the child but also the servants that have to do with him. Such thoroughgoing, absorbing attention to the child is, however, impossible even for the most loving mother who has other duties pressing upon her. She will therefore be obliged to limit herself to controlling the training of the child as far as possible. Everything that obstructs or harms the cerebral development—e. g., too long playing in the twilight, violent rocking, carrying always on the same arm, wholly unsuitable tight swathing, and many another thing important in the hygienic point of view—she must forbid; and at the same time she must wean herself from convenient but too far-going indulgence. Much, very much, here depends on repose and on self-control, especially in her relation to the child, and on unvarying justice, mildness, and consistency, even while the child as yet understands nothing of it. An ex-

haustive exposition of these precepts is not in place here, but it is necessary to allude to them; for every attempt to direct the childish will into the right ways remains fruitless unless the health of the brain remains unimpaired; unless, therefore, it is previously cared for with the greatest attention. Think of the difficulty, which may mount up to impossibility, of training a sick child! By the many attentions that are shown him on account of his illness, he is spoiled and mistrained; and the longer these continue, so much the harder it proves to be, at a later period, to escape the consequences of the spoiling, because at that time his will is no longer so pliable. While the senses and the brain should be spared in their activity, we should not forget the need of the use and practice of both.

It is only in the beginning that the will is easily directed; the iron can be forged only so long as it is warm and soft. Pliable as the will of the child seems at the beginning, it very soon becomes hard enough to defy the blow of the hammer like the cold anvil. True, willing is nothing, ultimately, but an extremely peculiar reciprocal action of motor ideas, as I have tried to show: but it may alter existing movements, may isolate them one from another, combine them for an act, repeat, strengthen and weaken, hasten and retard them. All this every human being learns in his childhood to do, through a countless

number of unsuccessful experiments, without direction, primarily because every human being comes into the world provided from the start with a certain capacity of sensation, perception, and thought, which sets to work spontaneously together with the likewise inborn capacity of movement. Later, however, the development of this capacity is carried further only under the direction of the child's kindred. Then the child no longer learns through self-instruction, as he does predominantly, nay, almost exclusively, in all the first period, but he learns through influence exerted on him by the members of his family.

Nevertheless, it is important to know that both ways of learning, hence both kinds of employment of the thinking capacity of the child, come to the same thing—viz., that external sense-impressions arouse motor ideas which have as a consequence definite movements. These are the willed, the deliberate movements.

Formerly, on the contrary, it was assumed, rather uncritically and quite generally, that the voluntary movements took place through a faculty of appetite or desire inborn in man, not capable of further analysis: the desire of the agreeable was the spring of all actions, all voluntary movements. But with such an assumption one gets no further than before in knowledge of the origin of the will; for the spring (or desire) is, after all, but a word that puts one riddle in place of

another. Desire presupposes the thing to be explained, the preferring, wishing, longing, the childish "I want it." I lay stress, therefore, on showing how little we are justified in continuing to regard desire as something original. Physiologically, at least, the child in the first part of his life behaves otherwise than as a being that desires. He has as yet no ideas. His relatives merely infer from the movements, the attitude, the position and situation of the child, certain mental states, as discomfort, displeasure, on account, it may be, of hunger. From their own subjective condition in like circumstances they infer, not without a mixture of imagination, the existence of a similar, or even the same, state in their child at the beginning of its life. As if the child knew in the least what hunger is, and had already a notion that its discomfort could be allayed by milk! The hungry newborn babe by no means cries because it desires milk; its crying is simply the expression of great discomfort. But why does it cry in discomfort? The correct answer can only be, that thereby a certain lessening of its discomfort is effected. For if this discomfort were increased by crying, the child would be quiet, and the vigorous movement of the respiratory muscles in the loud screaming, that is often almost intolerable even to the mother through its duration and strength, must be owing simply to a heightened excitability of the central organs of the nervous system.

If the function of nutrition is in a depressed condition from a lack of food, then the central nervous motor apparatus is much more excitable than in the child satisfied with food; it is more excitable in the child that is cold than in the one that is warm and comfortable; more excitable in the wet child, because warmth is withdrawn from him too, than in the one who is made dry. Hence, what is wrongly taken for the expression of desire is nothing but the necessary consequence of heightened excitability of the nervous system; and this excitability, as we see confirmed a hundredfold in the most different sorts of animals, increases and diminishes at the beginning of life chiefly in proportion to the absence or the supply of food and of fresh air, warmth and coolness; in brief, according to the fulfillment or nonfulfillment of the most important external conditions of existence. Thus the child behaves as if it desired, and yet it does not desire. But the repeated alternation of much movement in discomfort and less movement after alleviation of the discomfort, especially during the first days, leaves behind traces in the central nervous substance, which make possible and promote the association of the recollection of movement with the external impression that removes the discomfort; hence, in particular, the connection between lukewarm, sweet, white wetness (milk) with removal of discomfort. Another such impression is the cleans-

ing, warm, not-white, not-sweet wetness (bath); so, too, the smooth, soft, warm, white skin of the mother. In this way, through the gathering of primitive experiences, thinking is by degrees aroused; and through repetition of the agreeable and the disagreeable, these are gradually distinguished as sources of the feelings of pleasure and discomfort. Progress in the accuracy of this discrimination means practice. Mere lack of the agreeable is often, to the child, in a high degree disagreeable, causing discomfort, so that he soon reaches the point, by means of continual discrimination of light and dark, loud and low, warm and cold, dry and wet, etc., of avoiding as far as possible everything that excites in him unpleasant feelings, and even that which does not cause him pleasant feelings. This he effects by means of turning away, throwing away, and many other defensive movements formed out of the inborn defensive reflexes through the intervention of ideas. On the other hand, he adjusts himself to that which excites pleasure in him. While he is developing the hereditary instinctive movement of seizing, he grasps much, turns his head and his gaze toward that which excites pleasure, and begins to move in the corresponding direction. Then we say the child is seeking. But in this the effective agency is nothing mystical, is no immanent transcendent desire, no impulse in the sense of the earlier philosophers; physiologically speaking, it is in the last analysis the excitability of the pro-

toplasm in the nervous system. That is the living thing in the adult, as in the egg and in the child which stands between the two. That is what is capable of excitability, and which leads as well to the imperfect movements of the child as to the more perfect ideas, later on, of the adult who wills. It would take us too far to consider more in detail here upon this basis the process of willing, which is fundamentally connected with deliberation.

But to the completion of this sketch of the development of will in the child belongs at least the mention of his first attempts to control himself. Only through inhibitions of movements, a positive willing-not, not the mere omission of willing, does this great advance in the intellectual development show itself. So long as the child can not discern the very great value to himself of cleanliness—within the first three fourths of the first year in general, but in any case within the first half year—we can hardly speak of the beginning of inhibition of a reflex movement. But after unpleasant consequences of letting-himself-go have gradually been experienced, and the idea of the connection of this with his own conduct has been often repeated, there comes to him naturally the consideration that the stopping of certain movements and excretions, that quiet and obedience, are wont to be associated with more pleasant consequences than the opposite conduct which has hitherto prevailed

alone. Hence arise the first efforts to inhibit voluntarily some reflexes and instinctive movements; and herewith the germ of self-control is planted. For it is preposterous to suppose that movements such as crying in the night would be interrupted, or would not take place, simply on account of the lack of the requisite impulse—on account of there being no idea present to occasion the crying. No, the idea is present, but is silenced, overpowered, made ineffective, and such an inhibition is by all means of great consequence.

Here, then, we have a considerable development of the will of the child, and one that is of the greatest pedagogical importance. Yet the educator must be on his guard against straining the bow too tight and too often; otherwise the discomfort connected with every act of self-control will gain the preponderance over the results of insight into the advantage of that control. In itself the repose attained by voluntary inhibition is unchildlike, and a child that invariably controlled himself would cease to be a child.

CHAPTER V.

THE CHILD'S FIRST LEARNING.

For a long time and widely the error prevailed, that for the child's first learning there was absolute necessity of a teacher: as if only complete thoughts, ideas proceeding from the perceptions of adults and imparted by means of language—at first spoken, later by written or printed words—could be impressed upon the childish brain, and that only by this means, therefore, the mind would finally be developed in the right manner. Herein lies a gross fallacy, although one that often escapes notice. Because the highest culture can not be attained without thorough instruction in language, the inference was drawn that this culture is attained exclusively through instruction in language. Our schools are still suffering from this error. In the first period after birth—the dawn, as it were, of the intellectual life—instruction in language is of no account, because sense-perception is the means by which the child learns. His own seeing and feeling, his own experience—e. g., of pain when he hits himself, burns

himself, or falls down—these are the natural teachers of the little child. Not even the best pictorial illustrations of the things surrounding the child have anything like the educational value of one single object seen or felt by himself. One who sees the world through colored glasses gets a false notion of it. Yellow glasses lend to a landscape in winter a warm tone; blue ones in the midday heat of summer give a cold light, like that of the moon. Children who must make their acquaintance with the world through gay picture-books, indestructible or other, or through the varying, subjectively colored speech of adults, can not get the right notion of it. They will see it, on the one hand, in a bright light; on the other, in a dull. In culture, the great thing is a distinct view of the world based on one's own sense-perception. Without this we have no genuine picture of the world, but merely the picture of a picture, an incorrect copy.

This truth—which ought to be the criterion for the right training of children at home, as well as for the regulation of our whole school system, from the elementary up to the high school—becomes most plain when we inquire how it is that the human being comes to learn what no language, no picture, and no book, no influence whatever of another human being, can impart to him unless he has knowledge of it in advance.

The discrimination of colors, the discrimination of

tones, of cold and heat, of various tastes and smells—in fact, even the discrimination of light and dark, and that of left and right—all this no child can learn through words. This is a field in which I have been at work with special predilection for years, in the observation of little children; but it is too large to be traversed here in all directions. I limit myself to a few examples. How shall we teach a child the difference between red and green? All we can do is merely to make the difference plain when the child already feels it; words are nothing to the purpose, they have to do simply with the naming; and they sound differently in different languages, having no relation to the color-sensations as such. Just as little as we could succeed in making a normal child regard red and green as the same, or the fifth as not different from the octave, just so little can we succeed in imparting to him, if he is color-blind, the differences of these impressions by instruction through words. No man can communicate to another what color is, or describe to him a tone. And it is the same with all genuine sensations. One must himself have them, experience them, in order to know what they are. And this original self-experience is in general for all instruction, for the whole of the earliest education, far more important than the experiencing over again of that which others have already found out in themselves, and which they now at second-hand impress, cram, not to say pour in

through a funnel. Here applies in full force the saying, "If you don't feel it, you won't get it by running after it."

The extraordinary incitement which the direct observation of nature, and particularly of animate nature, gives during the whole season of childhood nothing else can supply or make good. A murmuring spring, a leaf, an ear of corn, a tiny beetle, a creeping snail, nay, even a single hair, becomes to the child, in the critical period of the development of his mind, a fountain of pleasure that absorbs him wholly. In dealing with the most insignificant things in play (cf. Chapter III), which is the most influential school for the cultivation of reason and of character, the mind gets its most abundant material for further development.

Thinking, in the proper sense of the word, can not be taught to any one by instruction through words. No child is instructed in it, but every one learns of himself to think, as well as to see and hear. We can do almost nothing toward it at the beginning, except to remove the obstacles that check it; and we must not hasten it. We can not prevent a normal child from thinking. But the finer development of the faculty of thought—i. e., of the inherited capacity for combining ideas that arise separately, and for separating combined ideas from one another—this is possible only through instruction, instruction in observation and in language, not in language alone. At any rate,

as appears from the biographies and the achievements of men who have received one-sided instruction, not sufficiently calling into exercise their own powers of observation, thinking is defective, judgment warped, and knowledge of one's relations to the world arrested, unless one is from childhood familiar with realities through his own experience. But on this side, too, there is danger of having too much of a good thing. A one-sidedness in the direction of mere observation, caused by devotion to the business in hand, by exclusive occupation with reality of one kind only, does not permit a symmetrical development to take place; and the difficulty in making up later what was neglected in youth is, that the plasticity is lost. The young hand easily learns every new trade, the old hand no longer any.

If in a large manufactory one workman does, for years, nothing but cut paper, another nothing but fold it, a third merely packs it, these men can not easily exchange their parts on a sudden without damage to the establishment, nor can they be as well employed for any other kind of work offhand.

The great evils of a one-sided instruction, which is based perhaps preponderatingly or exclusively upon writing and reading, together with the memorizing that goes with it—the study of letters, in fact—may already be made intelligible in some degree from the physiological point of view. On account of the peda-

gogical importance of the after consequences, I will briefly show how.

Although during the last decade a considerable number of skillful experimenters, each of whom thinks he alone has found the truth of the matter, have been contending over the assignment of the various functions of the brain to the separate portions of the brain; and although, without doubt, the controversy as to details will last a long time yet, still the fact can no longer be doubted that quite definite tracts of the cerebral surface are associated with quite definite sense-areas and kinds of movements. To mention a single one, the physiologist, Hermann Munk, has succeeded, after victorious refutation of many attacks, in demonstrating that the already mentioned portion of the occipital lobe designated as the visual sphere (p. 9) is the only place in which visual impressions are elaborated into visual ideas; and, further, it can not, when fully developed, perform any other functions than those belonging to the act of vision. If this spot is stimulated, then movements of the eyes take place. In like manner can no longer be doubted the existence of a cerebral center that has been much longer known, the speech center discovered by the distinguished Parisian physician and investigator, Broca. These are merely examples. Whether, as upon the map separate countries are sharply defined from one another, so likewise separate districts of the cerebral cortex abut

directly upon one another, or whether they overlap one another, like areas of touch on the surface of the skin, or at least are not to be discriminated with accuracy from one another, it is at any rate certain that the development of the cerebral centers—that is, of areas of the cerebral cortex associated with specific intellectual activities—is connected with exercise or practice, with the frequent repetition of the same kinds of movements and of sense-impressions.

One who never learns to speak has no speech center. No animal has such a center, because no animal is capable of exercising himself sufficiently in the coordinated use of his tongue and his laryngeal nerves and muscles, with simultaneous employment of his voice as expression of his ideas. And even the microcephalous human child, whose skull has become ossified prematurely so that the brain found no room for further growth—the cretin, the idiot, capable of life indeed, but incapable of speech—these all are in the same condition. The vocal nerves and muscles, the tongue and the larynx, are developed; sensations, perceptions, and ideas are not lacking, although they remain upon a lower level; but the ability to express these by means of the vocal apparatus and articulation, this it is that is wanting to them, even when their hearing is perfect. They can not build the bridge from hearing to speaking, because their brain declines to serve. The brain is developed only through activ-

ity, and only through that are the functions localized and associated in it. It is from the beginning fitted out in the most luxurious manner with capacities for learning everything possible; but not all brains just alike, because heredity plays an essential part here. A child may not possess a single one of the many superior talents of his father and mother, but may have inherited instead a very different talent from his grandparents or great-grandparents. Hundreds of various proficiencies, which human beings acquire with greater or less facility, particularly in youth, necessitate, each for itself, the development of a special center in the brain, the injury or destruction of which will entail the abolishment of the possibility of retaining that proficiency, and hence of continuing the cerebral activity corresponding to it. Strange as it may sound, it is nevertheless true that this holds good not only for arts laboriously acquired, perfected in a long course of years by the man of cultivation, such as playing on the pianoforte, writing, drawing, painting, but also for much less esteemed handicrafts, sewing, knitting, crocheting, lace-making, planing, sawing, carving, milking, etc.

What need of multiplying instances? It is enough simply to point to the comparative physiology of the brain and the pathological anatomy of the human brain, as well as the experimental physiology of the brain of two very intelligent animals, viz., the dog

and the monkey, in order to make evident that according to the occupation, according to the predominating activity of an animal or of a human child, its brain must allow more room now for this, now for that function. A creature born blind has no visual sphere and does not acquire any; one born deaf, no auditory sphere. These proportionally large areas of the brain go to waste, or else remain free in part for different uses. It is known that the blind have more sensibility of touch than the seeing, and that the deaf very often see better than do those that hear. The auditory sphere borders on the visual. The mammals almost without exception have, as I stated (p. 19), a much larger olfactory lobe than man has, because they occupy themselves more with smelling than he does, and this characteristic is transmitted to their posterity in increased degree. The latest experiments of surgeons and anatomists have demonstrated that in certain disturbances of vision certain lesions of the visual area in the brain exist, just as in case of certain disturbances of movements of the limbs are found certain alterations in certain portions of the central nervous system, which may be the result of arrested nutrition, of poisoning, injury, or inflammation.

All these new experiences are, in my opinion, eminently significant in regard to the training and instruction of our children; for it is clear that, if influence is exerted in a definite and always in the same

direction upon the exceedingly impressionable, plastic brain of the child, the brain must from the start be developed in a one-sided manner for the entire life, and that the finest characteristic a man can possibly have—viz., harmonious culture—can not be attained.

By harmonious activity of mind I understand an activity in which the intellectual and the emotional are in equipoise; the emotions do not disturb the working of the intellect, neither does a stark intellectualism (such as at this day unfortunately too often appears precisely in the most cultivated classes) prevent feeling from having its due. Harmonious culture, however, implies that the senses, and therefore the observing powers, shall be exercised, and that the body, including the whole external personality, shall not be neglected as compared with the mind. This must be taken into account even in the case of the smallest child, by regulating the external impressions that act upon him; and this involves selection of what he is to learn.

The recognition of the extraordinary power committed to the family of the little child—a power that is later transferred to the child himself, in the ability to choose what is to be learned—must necessarily heighten the feeling of responsibility in the members of the family. It is a pressing duty in these days to have regard to physiology in selecting what is to be learned, as well as in determining the way in which it

is to be learned. If we do not heed this, if we forget that neither one-sided concentration upon reading and writing, which means overfilling of the brain with images of letters or figures, nor occupation with anything and everything, continually changing, which means dissipation, is serviceable for the intellectual germs in the growing brain of the child, then we ought not to be surprised at the evil consequences that show themselves in the shape of arrested mental growth both at home and in the school. Physicians, especially the superintendents of clinical hospitals and alienists, have frequent opportunity to observe those diseases that are caused by too long and persistent tension of a single part of the nervous system, and the consequent excessive one-sidedness. Many of these diseases are up to the present time incurable. But teachers, who have opportunity only in exceptional cases to observe their pupils in later life after these have left school, do not note in the individual case what wrong they have done. Those consequences that make medical treatment necessary are classed in part under the head of "trade or occupation-neuroses." There is a whole catalogue of convulsions and paralytic affections which are occasioned, like writer's cramp, sewing cramp, telegrapher's cramp, exclusively by the practice, carried too far, of one and the same form of activity with which the brain has from the beginning been drawn into sympathy; and extraordinary

patience, great acuteness, and much skill are required in order to alleviate these stubborn ailments. But before it gets so far as this, there are disturbances that do not appear on the surface and are not thought remarkable until great numbers of persons are seized at the same time as by an epidemic nervousness, and their intellectual activity is turned away from the natural, from the things that concern us in health, and is occupied with illusions. So it is with children who are too early forced to become book-learned. But it would carry us too far to set forth here the bearing of the child's mental development upon reform in methods of instruction, which is coming to be regarded more seriously since I have shown it to be necessary from a biological standpoint. What I have just said is enough to show how much the mother should think about the care of the nervous system of her darling, in the very first period of the child's learning. More consideration is commonly shown for the stomach than for the brain. The brain, I repeat, should neither be developed predominantly in one direction through preference of a single occupation or through exclusive use of one organ of sense, which produces one-sidedness; nor through the supply of intellectual pabulum from all possible quarters, which causes dilettanteism. The great thing is rather, as has long since been expressed very briefly and forcibly, "letting the child alone." At the beginning of life the organic basis

of mental activity is capable of everything good and everything bad, but concealed as yet, like the flower in the bud.

True, the newborn child is, as I have already remarked (p. 7), capable of a sensation of light, but is not yet able to see. He is "mind-blind." Further, he is prepared to hear soon all kinds of sounds, to smell, to taste, to feel; but he is still mind-deaf, mentally insensible—i. e., he has a sensation of light, of sound, of warmth, and of impressions upon his skin and his organs of sense in general, but has as yet no understanding of it all, because his cerebral hemispheres are not yet developed. Our language, unfortunately, lacks names for these conditions of central *anosmia* (smell-blindness—i. e., inability to interpret sensations of smell, a condition in which many adults continue through life); central *ageusia* (taste-blindness); central *anæsthesia* (touch-blindness—i. e., inability to interpret impressions of touch); central *akinesia* (movement-blindness). Yet all children must experience these states of physiological defect as necessary phases of development. Their organs of sense they have, and those organs are in good condition and receive the most manifold impressions from without; the nerves are stimulated, but the proper parts of the cerebral cortex are not yet capable of performing their functions. We must therefore let the child alone while he is learning to see and hear, and for a con-

siderable time after. The disadvantage arising from a later beginning of methodical instruction is in any case far less than the harm done by over-excitement through beginning too early.

The earlier the imperfectly developed central nervous system is subjected to a strain in a one-sided manner, or even in a manifold activity, so much the earlier does it become dulled and so much the less plasticity it retains for later use. But the longer it retains its receptivity, so much the longer does youth last. He who is interested in much, has in advance a great advantage over the indifferent person, and remains young even in age; whereas the indifferent becomes old in the season of youth. What we call intellectual freshness is essentially the extremely valuable faculty of taking an interest in many things and yet of applying one's self at will persistently, and with concentrated attention to a single subject. The little child can not do either of these things. He is at first interested in little else than his milk, and during his first year can not direct his attention long to one and the same thing without fatigue. But he learns both these things, without the instruction of grown people, in play, and in play his impressionability perceptibly increases. Hence it is advisable not to shorten unnecessarily the first learning-time of the child, in which he learns most through self-instruction, through his own experiences in what we call childish play.

The child's learning to think consists chiefly in this: the *understanding* of the simple elements among the innumerable sense-impressions, which are the stimuli of his sensory nerves, and which follow one another in irregular alternation, now strong, now weak. Much time is needed for this process; for understanding begins with the operation of the lowest intellectual function, *discrimination*, which belongs to all animals, and even, in a certain fashion, to the living cell-contents of plants. Every living thing possesses a faculty of discrimination. The living protoplasm in the green plant, for example, discriminates between light and darkness, and behaves very differently by day and by night. The smallest living microbes distinguish acutely between the character of the habitat suitable for fostering them and the unsuitable; and they increase in the former lodging rapidly, producing often wasting diseases, while in the latter they multiply slightly or not at all.

Animals distinguish, by means of the living protoplasm of their sensory cells, the sensations occasioned by impressions upon their skin, their eyes, their organs of sense in general. So does the human child. But he goes much farther, for he distinguishes too, much more acutely than the animal, the ideas arising from the sensations, feelings, perceptions, by means of the living protoplasm of his brain. What seemed at the beginning the same, or very like, is gradually

separated into not the same and not like. And from this it appears that it is much easier to discover the likenesses of different impressions than the differences of like impressions. How often occurs, even with the adult, the confounding of two physiognomies! Here the resemblances of the two strike the eye at once, whereas longer observation is required to satisfy us in regard to the unlikeness, or at any rate to express that in words. The child is much better organized for the apprehension of small agreements than for the apprehension of small variations. He takes the wine-bottle for his milk-bottle, the whitish Goulard water in it for his milk; and he amuses his mother by confounding a hundred small objects, or sounds, that resemble one another, while he is practicing himself in discrimination.

It is because pleasure arises from many imperceptible agreements—a consonance; whereas displeasure is caused by lack of agreement—dissonance—as was remarked in the year 1712 by the great Leibnitz in regard to music; it is for this reason that the agreement found by one's self is preferred, while the disturbance of the agreement in details, that is sought out or forced upon us, is less regarded. In the course of countless generations this unequal valuation of the impressions has become established through inheritance, so that now the child in his learning to think, in his discrimination of ideas, much prefers to put together

and keep together similar qualities rather than dissimilar; the latter do not give so much satisfaction, or at any rate not so much delight.

In this matter the primitive activity of the understanding, *comparison*, finds the most extended employment. It forms the basis of all later processes of thought.

We may find at once instruction and entertainment in observing the manner in which little children compare (together) two objects recognized as different, placing them side by side, over and under each other; how the difference is made larger or smaller, and one or the other is pulled and twisted and turned upside down. But the manifold significance of simple designations of space, as, for example, of the words "Round the other way," in regard to a ninepin, perhaps, that is to be laid in a box, is not to be expressed by words. When the child ignorant of words turns the ninepin, reverses it, turns it to the left, to the right, inclines it with the head of it down, then up, and then lays it crosswise, he is comparing it. He is *thinking* and learning; and by such trying and testing he is gradually prepared to compare in like manner more complicated objects; but not yet events, and not abstract, higher ideas derived from objects and events—i. e., concepts. For this there is need of language.

As a whole, the first development of thinking and learning in the child may be compared to the first de-

velopment of the forms of the animal coming to being in the egg. The first thing that happens is the separation of the homogeneous, or at least undistinguishable, formative cells into heterogeneous, the differences of which become greater and greater in the progress of the development. If the differentiation progresses properly, without disturbance, every group has then a certain size in proportion to the whole, a certain condition and function, and a faultless being is born. But if this harmonious development is disturbed, then it may easily happen that one group of formative cells grows faster than the others, and at their expense. In consequence of this, some parts are arrested in their development during their differentiation, and some one part gets an exaggerated, monstrous development. The final outcome is, under the circumstances, an ugly abortion incapable of life.

The application of this description to the child's learning follows of itself from what has gone before.

CHAPTER VI.

INTELLECT WITHOUT LANGUAGE AND LANGUAGE WITHOUT INTELLECT.

If the capacity of thought is inborn in every human being—and there can no longer be a doubt about it—the consequence does not follow that the human being can reach a high grade of development without language. Even at this day many persons suppose that without articulate speech, and therefore without words, there is no understanding, no thinking, no memory even. I have, however, proved that careful observation of little children alone, particularly of those born deaf and who do not learn ordinary language, furnishes complete proof of the incorrectness of this tradition of the schools. In fact, we do not need first to point to the understanding of animals, to the abundant and excellent observations made by friends of animals in the fields and the woods, in zoölogical gardens and aquariums—observations somewhat more taken into account of late years by scientific investigators; we need only to go diligently to

work in the nurseries of our own homes, in order to collect facts for the demonstration.

When, for example, the child as yet absolutely without speech strikes, with a spoon in his right hand, the plate, the newspaper, the table, takes notice of the sound, and thereupon, taking the spoon in his left hand, repeats the same acoustic experiments, there is in this a sign of intellect which seeks for causes. The cause of the sound is not in the right hand, as the right hand is not the only one that produces the sound; and, what surprises the child most when he strikes on the plate, not only can the right hand, pressed firmly on it, dull the sound made by striking with the left hand, but likewise the left hand can dull the sound when the striking is done with the right. Thus an infant deliberates when he has no knowledge or use of words. If the child has learned to walk, but not yet to talk, he surprises us by his notions. He wants to take down a biscuit from the cupboard that is too high for him; he tries in vain, and then, without any suggestion from others, he goes and gets a cricket, and with unspeakable effort brings it to the right place. Now he can conveniently lay hold of the thing desired. All this involves an extended process of deliberation, the application of experiences, and without language. The child's reasoning, even when erroneous, is, in the utter lack of language, a proof of the development of the intellect for itself. For example, when

the child that has no language has shut a door so that the lock catches, and every adult person must regard the door as closed fast, the child often tries it a long time with his fingers, and presses against it with his body; he is testing whether the door is really shut; he doubts about it because he does not understand the effect of the bolt. If the watering-pot has become empty, the child keeps on, none the less, watering the flowers with it, probably in the belief that the watering-pot must, when in the right position, continue to supply water, inasmuch as he has seen water come out to the last when adults were watering plants. Even the continuance of the sucking at an empty nursing-bottle, which was perhaps not sufficiently filled, is an act of intellect; for continued sucking at the breast did bring more milk into the mouth, and hence the erroneous inference in spite of the fact that the bottle can be seen to be empty. Another sign of intellect is the holding up of an earring to the mother's ear by an infant wholly destitute of language. As soon as he begins to combine such earlier observations of a complex nature with present ones, thought-activity is already well advanced.

It affords a special intellectual pleasure to discover such facts in the second half year of a child's life. Any one who observes attentively and patiently, and who practices himself in interpreting the expression of the childish countenance, must acquire the conviction

that every human being, long before he learns his mother-tongue—nay, before he understands the meaning of words—at any rate entirely independently of any possible premature understanding of words—shows intelligent actions, is capable of deliberation, and—a fact on which especial stress is to be laid—he surpasses, precisely in this direction, the most highly endowed vertebrate animals; for it must not be forgotten that in those creatures the most surprising exhibitions of their intellectual activity are brought about by training at the hands of man: e. g., counting up to five, by the great ape which Romanes trained and caused to be trained, with straws; and the performances of bird-dogs in seeking and fetching. The Indian elephants, the Arabian horses, the St. Bernard dogs, and tame monkeys, when they have attained the highest degree of development of brute intellect, understand more of human language, of the commands of their masters, than the human child understands (although he surpasses those animals in sagacity) of the *words* that his mother says to him. The child, while ignorant of language, has already more intellect than the most sagacious animal at the highest point of its intellectual development, because he learns faster than any animal whatever.

But the objection might be urged that the child has merely learned, after all, to act intelligently on account of his intercourse with intelligent human

beings that use language, and in fact exclusively on account of his hearing spoken language which has, unconsciously on his part, been appropriated and utilized by him, so that in reality it is language alone that has brought to development the intellect of the child not yet able to speak. It is therefore important to observe also those children in whom every possibility of this sort is lacking. Children born completely deaf are unfortunately not very rare; and although the so-called deaf and dumb, who, as we know, are not dumb, but only word-dumb, and do utter inarticulate sounds, can later, by means of toilsome instruction, be advanced to talking with the fingers, and partially to articulate speech by means of the touch-sense of the tongue and the reading of the lips, still there are many who grow up without instruction in verbal language. These children have, however, through the senses of sight and touch, a large number of ideas, and they often have a remarkable understanding. They can make themselves understood when with their fellows by looks, gestures, and all sorts of signs that are quite unintelligible to adults. They have at their disposal an elaborately developed mimic art that is extraordinary. They are pantomimists. And the height of culture such a deaf-mute can reach proves at least that the existence of the intellect is not bound up with the hearing or learning of articulate speech. Actual proofs, as well as simple inferences

from unquestionable experiences of teachers of deaf-mutes, demonstrate that quite generally the formation of simple ideas and the combination of them into new ideas, and also the separation of individual ideas from a complication of them—in a word, thought—is not dependent upon the learning of words. Rather is it the case, as I have shown in the book that has been mentioned, that ideas are the necessary previous condition for the understanding of the first words learned, and therefore for learning to talk. If these ideas are wanting, the development of language is not attained; there is only a certain, very slight, development of the intellect, which does not go beyond that of the brute.

This higher animal intelligence is shown by those human beings, degraded or grown wild, whom we call "brute-men," who happily are but rarely found in civilized countries. The farther civilization spreads, the more seldom will it be possible for little children, separated through accident or malicious intent from human society, to grow up in the wilderness partly with beasts, so that years may pass before they are captured. The few accounts of such cases have a peculiar value because no experiment can supply the place of them. Unfortunately, the narratives extant are very untrustworthy and defective; they come mostly from the earlier centuries, and have not been under the censorship of trained physiologists and

psychologists. Still, whatever the deduction to be made for arbitrary additions from the imagination of the chroniclers, this much remains: that children growing up in the wilderness do not in all cases lose the capacity for culture, and are not by any means completely imbruted.

Several cases may be found described in the treatise of Prof. A. Rauber (the value of which is not sufficiently appreciated), published in 1885, entitled "Homo Sapiens Ferus, or the Condition of the Human Being Become Wild and its Significance for Science, the State, and the School." In general, the accounts are to the effect that of wild beasts or beasts of the chase, with which the isolated children are said to have grown up, only bears and wolves are named; of domestic animals that graze on the mountains, only sheep and *pecora* (possibly goats). The countries in which within the last five centuries such brute-children, forest-children, mountain-children, or whatever they may be called, have been captured, are Ireland, Belgium, Holland (on the Rhenish-Prussian border), Lithuania, Siebenbürgen (on the Wallachian border), Hungary, France (Champagne, Aveyron, the Pyrenees), and Germany (Hesse, Bavaria, Hanover). Considering the geographical dissimilarity of the distribution, together with the striking similarity in accounts that come, independent of one another, out of the most varied times concerning the behavior of the

foundlings, the most stubborn doubter must admit that we are not dealing here with mere legends.

The accounts really deserve a very thorough examination. Every one of them is instructive, and shows how little applicable to the uneducated, isolated human being are the words of Schiller: "The dignity of man! no more of that, I pray you. Give him food and a place to dwell in; when you have covered his nakedness, the dignity will come of itself."

For the question before us several details are important, because they show that an imbrutement caused by the separation of children from human society does not, after all, invariably suppress the capacity of intellectual development; and that those imbruted children that learned to talk had a whole circle of ideas, and turned to practical account the experiences they had in the wilderness.

The Hessian boy, unable to speak, who was captured about the middle of the fourteenth century, ran on all-fours, but learned to walk erect and to talk.

The Bamberg boy without speech (at the close of the sixteenth century) showed an "astonishing suppleness and nimbleness in jumping and running, especially on all-fours," but among human beings he gradually took on "an orderly behavior," and married; he must, therefore, have learned also to walk upright and to talk.

The Irish youth (in the seventeenth century) with-

out speech "bleated like a sheep," and did not put off his brutish ways (*sylvestre ingenium*) except through constraint and after living a long time among human beings.

The Lithuanian boy (likewise in the seventeenth century) had a voice like a bear's, but learned, according to one account, to speak; according to another, not; and learned to walk erect.

The famous Peter von Hameln, who was discovered in 1724, walked erect, but, as it appears, learned to talk but little, as was the case with the boy of Aveyron.

On the other hand, the girl of Songi (1731) acquired speech perfectly, although at first she acted like a beast of prey.

As to other human "wildings," it is not reported that they did not learn to speak at all, but neither is it reported that they did learn to speak; the accounts are too scanty.

The outcome of the facts in our possession is, that the development of the brain is very considerably retarded in case of a separation of many years' duration of a child from other human beings, in spite of a prodigious development of sense-acuteness and muscular strength, but that the capability of development is not lost.

Still, the difficulty of humanizing the imbruted child is far greater than that of developing the original

child, because in the former too much has to be unlearned which in the latter exists only potentially, and is checked in advance in its development; and also because the finer development of the cerebral cortex, indispensable to the higher intellectual activity, has been kept back in consequence of the lack of impressions, particularly of human actions worthy of imitation. The cerebral hemispheres would inevitably lose in plasticity as years went on.

But these imbruted children, although they do not talk—some of them even do not laugh—and do not learn to walk upright, can yet seek their food with great skill, and with a slyness, suppleness, dexterity, and endurance nowhere else observed in human beings; and they attain later, with careful treatment and, what is more to the point here, through gradual instruction, a degree—though, to be sure, a very low degree—of culture. This would not be possible if they had not human intellect: otherwise, animals without understanding would in like manner be capable of being civilized; but all attempts in this direction have failed.

On the other hand, these same imbruted children furnish the proof of the indispensableness of the learning of language for the attainment of *full* intellectual activity and the development of feeling by means of learning to speak in the first years of life; for they have almost all lost the ability to frame thoughts that

go beyond the immediate surroundings, and to rise to higher concepts—to the highest reason. That this capacity which first lends to human life its true worth, is possible only through the learning of language—and, in fact, of verbal language, not picture-language or sign-language, or any other means of understanding —nobody denies. Nevertheless, we must not therefore suppose that with the complete possession of verbal language is given at the same time a perfect reason also. There are superior instruments that are played in a masterly manner by musicians unsurpassed in the technique of their profession, yet these musicians do not all have what we call "soul" in music. So there are eminent speakers and learned men who are masters of several, perhaps a dozen, different languages, but who may not have anywhere near so much intellect as some silent thinker who knows only his mother-tongue, and yet sets a world astir through his combinations.

In the child, too, no special activity of intellect is proved by the quick learning of speech, the extended knowledge of words, and the ready use of words learned. On the contrary, excessive speaking argues less intelligence, because, of course, less time remains for thinking. There are cases of mental derangement and anomalies, in which men and women put together meaningless words, just as the child does at a certain epoch of its development, in continually repeated suc-

cession, intolerable at last to the hearers, sometimes uttering them with monotonous voice, sometimes with varying tones, screaming, singing, babbling. Here we have language without intellect; the talking engine lacks an engineer, the driver of the wagon has dropped the reins, the horses have run away and are leaping without control. In the idiot, on the other hand, language is lacking on account of defective development of his brain from the beginning. The ideas necessary for the learning of verbal language can not be formed at all; hence he remains at the stage of an irrational animal. In vain do we look for signs of a higher intellectual activity in him, such as we find in the normally formed child that grows up in isolation, without the formative impressions of human society.

From these considerations we see how indispensable for the development of the higher activity of intellect in the child is the learning of speech. This does not indeed generate reason, but without it reason does not come to development. But we perceive also that to the learning of language there go two kinds of things: first, a plastic brain with the organs of sense belonging to it; second, certain influences of other human beings to act on these organs of sense and thereby on the brain, so that it, while it is growing, develops itself more finely in certain portions. Now, how must the ideas be constituted which are requisite

for the learning of speech, and which make articulate speech possible?

This question can be satisfactorily answered only when the nature of the impressions is ascertained which act, on the part of the mother and the other members of the family, particularly the elder brothers and sisters, upon the child before it learns to speak. These must first be considered, at any rate, because without them language is not forthcoming. Here, above all, must be mentioned the looks and gestures, the changes of place, the various bodily movements of the child's relatives. More effective even than the voice, after the first three months, is the expression of the countenance of the mother. Even in the second month she may be recognized and localized, together with her voice. Individual children distinguish with certainty as early as the third month whether the mother has a hat on or not; and toward the end of the first three months the signs of intellect are multiplied with surprising rapidity. The friendly look is distinguished from the severe, the cheerful from the serious, with accuracy. A slow turning away of the mother's gaze is already an intelligible sign of disapprobation, while a barely perceptible raising of the corners of the mouth indicates a satisfied frame of mind, which the child with a smile understands. It is as if between mother and child there existed a community of soul. She seems to think of the child even

in her sleep, and the child feels without words what its mother wishes. A great number of adaptive movements made by members of the family are understood without the slightest possibility of imitating them or of intentionally executing similar ones. The child's look, when he is scanning the doings of adults about him, often takes on an inquiring expression that is strongly marked as early as the fifth month. Their coming and going, their sitting down and standing up, their walking and turning about, attract in a high degree the attention of the infant. He gives one the impression of studying what significance these changes in his field of vision may have. Meanwhile he has developed the inherited, but never innate, movement of seizing; he stretches out his arms longingly, and he examines by feeling not only inanimate things but also the separate parts of the heads of his father and mother, pulls at their hair, convincing himself that it is firmly? attached, also at their ears, and he follows with his gaze the movements of the hand that is about to offer anything to him or to take something away.

A thing that did not make the least impression during the first two months—the quick thrusting of the hand or of one's head at the face of the babe—now, after the eighth week has passed, suddenly produces a winking of the eyes, as in the case of adults. This proves clearly that the sudden altera-

tion in the babe's field of vision is perceived. The movement I am speaking of is a very quick, responsive movement, having the character of a reflex and an acquired reflex. But it is not of the same order as the before-mentioned alteration of the pupil when the eye is suddenly exposed to light. This latter reflex is hereditary and innate, and does not require for its existence so high an order of brain centers as does the other visual reflex, which does not appear until the visual spheres have entered upon their function. Hence I regard this winking of the eyes as a criterion for the beginning of a higher cerebral activity, and in particular of the representation, in idea, of a movement. For if the closing of the lid follows, there must take place an intellectual elaboration, however brief, of an alteration in the field of vision—a process that had not taken place previously. Previously you might sprinkle water on the eye, and the eye would not be closed; now you can not approach the eye without occasioning the closing of the lid. But when this reaction is once inaugurated, it remains throughout the whole life; and, as we know, a good deal of practice and of self-control are needed to refrain from starting when a hand is suddenly thrust at the face, even when there is a glass plate between the two. There is in this movement a kind of defense against a disagreeble impression. Every considerable sudden alteration in the field of vision, even

when it has agreeable consequences, is yet disagreeable at the first instant on account of its suddenness. And if the infant has perceived this, he already manifests intellect; and his lid-movement might be designated as the first expression of it, as a speech without words.

But he speaks, very soon after this, through a whole series of other movements which gradually emerge out of the incoördinate, aimless, partly impulsive, partly reflexive, and instinctive muscular contractions that he brings with him into the world. Thus even the persistent holding up of the head, which no child accomplishes before the beginning of the third month, is in itself an expression of incipient thinking, though of a very primitive sort. It proves that the great disadvantages of the wabbling of the head hither and thither, of its falling forward or to the right or left or backward, are perceived. The strength of the muscles of the neck would have sufficed to hold the head up earlier, but no necessity existed for it so long as the seeing and hearing, the taking of nourishment, and the manifold movements of the limbs, went on well enough without the participation of the head movements. Now, the great advantage of turnings of the head, particularly in looking to the right or left, up and down, over and under, is perceived; and from this time on (during the sixteenth week in some individuals) the head is held quite erect,

and this attitude is a further language without words. It says, "I will."

Although not many combined muscular movements at so early a period can be demonstrated to be signs of advancing intelligence, as perhaps the shaking of the head in refusal, the raising of the upper part of the body without help, so many the more of them there are in the second half year. In particular, the pointing that is developed out of seizing, the first attempts at learning to sit, to stand, to walk, to avoid table corners and other obstacles, the first efforts to get up, to step over a threshold, the carefulness shown in doing it, as well as the fear of falling—these things, occurring with many children long before they learn to talk, prove the existence of deliberation and of a speech without words.

So, too, we must regard as a proof, and a weighty one, of the formation of associations of ideas previous to articulate speech, the rapid appropriation by the little child of many conventional looks, gestures, and occupations of adults. Not that special deliberation is required for smiling when smiled at, for drawing down the corners of the mouth when scolded at, for crying when struck, for making defensive movements when seized hold of; what we are concerned with is rather a whole series of complicated imitative movements that are multiplied especially at the end of the first year of life. Combing and sewing, brushing and

wiping, reading and writing, greeting and shaking hands, kissing and laughing—all these things are more or less adroitly imitated. And although the significance of these movements is in part not yet understood, still the fact itself of imitation, without any accompanying verbal explanation on the part of the parents, and without a single word spoken by the child, is surely a proof of the existence of a deliberation that prepares the way for verbal language. The childish imagination masters every movement that can serve as entertainment. Complete understanding of most of the movements, however, is not gained by the little imitative automaton except by means of the aid of verbal language. Meanwhile there exists long beforehand an imperfect understanding of what is done by adults and by other children, and an unmistakable language without words. By means of looks and a distinctly marked play of gesture in which the arms take an important part, the will of the child is expressed before he can speak with the tongue. By many independent combinations in his silent play the child makes known that he has ideas, that he associates them and separates them, before he speaks a single word. And this understanding without language places him, even in his first year of life, at a height far above those pitiable patients who, through injury to the brain, can no longer use language properly, because they are confused, because they can no longer

hold their ideas in connection with one another, and can no longer rightly separate them from one another. Their language without intellect has no significance, but the child's intellect without language forms the foundation of the whole later mental life.

CHAPTER VII.

THE LEARNING OF SPEECH.

UNFORTUNATELY, no one remembers the time when he had not command of speech. Although every educated person has labored for years with great zeal to learn his mother-tongue, and to perfect himself in the use of it, yet no one knows now what his feelings were before he began this self-instruction. Nor is it possible, by the most careful questioning of the child who is learning to speak, to get information concerning his intellectual condition; inasmuch as when he knows it he can not communicate anything of it in words, and later, when he has learned to talk, the remembrance of that speechless condition has vanished. And yet what a contrast there is between the babe, speechless, powerless, resembling in more than one respect the brute, comparable now to the larva, greedy for food, now to the sluggish, hibernating animal—what a contrast between him and the orator who uses words with precision, who is never at a loss for the right expression, and with no adventi-

tious aids, merely by his speech, merely by means of the vibration of his vocal cords, powerfully affects his hearers! I still remember well the time when, after unspeakably toilsome but fruitless efforts to teach my son one single word only, I used to be possessed almost every day by the thought, "And this awkward creature, who can not even blab a single syllable in imitation, like a parrot, is one day to talk with me as I talk with him! to be perhaps a speaker in the Legislature, to learn in addition to his mother-tongue other languages also! I am curious to observe this metamorphosis; but it is sometimes very doubtful to me whether the child will ever be able to learn to speak." Other parents have assuredly like thoughts; and their joy at the first words spoken by their children, if less pronounced than their delight at the first walking erect without assistance, is so, probably, merely for the reason that the speech does not make its appearance so suddenly. We should be in possession of much better material concerning the child's becoming a human being, a process completed by the acquirement of speech, if parents would more often conscientiously put upon paper what they hear of the first attempts at speaking, and would furnish us with the correct dates. It may be declared almost an impossibility that a sound child, growing up among human beings, should not learn to speak. Thus there is no lack of material for observation.

So far as I know, however, I am the only one who has carried through a series of observations upon a child, including almost every day from the beginning of his life until the end of his third year. I strongly advise the repetition of this labor, for it heightens the parent's joy in the child, and furthers the knowledge of mental development, even when the observer is not a physiologist. This study, from the nature of the case (let me say as a recommendation of it), is less likely to put out of tune an artistic temperament, with the employment of analysis and taking to pieces, than is any other kind of scientific observation, for the reason that the child's ever-recurring amusing attempts to repeat words that are too difficult for him, and in general the synthetic character that pervades the whole process of the acquirement of speech, give a high degree of gratification. Think, too, of the joyous child-face, and we may be sure that such observations as I desire and as I shall be glad to make use of, provided only they are trustworthy, do not by any means necessitate unusual effort; especially as they should never be long continued at any one time, lest the child may become wearied.

The main thing, rather, in studying the acquirement of speech is to make very frequent, occasional, but always brief, observations of one and the same child, who is in the normal condition. He must not know, even after our first studies are over, that we are

interested in his imperfect utterances; else all too easily is lost the *naïveté* that never returns, the child-like naturalness that precludes all dissimulation. If this happens, the natural course of development of the learning of speech is disturbed also.

The first thing with which the learning of speech begins is not, as was formerly assumed, the first cry of the newly born, for this can have no other significance than that of a reflex, like sneezing, for instance. In fact, it often occurs that children announce their entrance into the world by a sneeze instead of a cry. But when strong impressions of various kinds have alternated with one another—when feelings such as hunger, pain, cold, on the one hand, and satiety, pleasure, warmth, on the other, have been discriminated, then crying acquires a speech-significance, and the mood of the child may be perceived through the variations in his voice. In pain the tone is higher than in hunger—often a piercing tone; in the joyous "crowing," in laughing, it is much louder and of quite different timbre than in whimpering on account of cold or wet. But all loud utterances of this sort that express bodily, and very soon also mental, states, are the farthest possible from being portions of an articulate language; rather are they completely analogous to the language of animals. Nor have those syllables the least claim to significance as language which are heard sometimes as early as the seventh or

eighth week, but which have not been observed hitherto with sufficient accuracy as to the date of their first appearance: as *ba*, *ma*, *am*, *ab*, *gö*, and also *rö*. These are produced, just as are the later sounds, which can not be in any way written down, in the babbling monologues of the infant, by the movements of the vocal muscles, often through pure accident; and they have at the beginning no more psychogenetic significance than snoring, or the irregular, gradually coordinated movements of the arms and legs or of the facial muscles. The production of sounds, and of simple, meaningless syllables made up of sounds, has for the child, however, an advantage over these muscular movements because it has an acoustic effect. The ear of the crying and babbling babe receives the sounds produced by the larynx and the oral cavity, so that these become the source of a new pleasure. Therefore the child repeats, with a persistence often intolerable to the adult, the same syllable, the same cry.

These utterances even in the third quarter of the first year are still almost wholly devoid of significance as language; but in the fourth quarter the character of them very often changes, and we may perceive that sounds uttered are influenced by the sounds heard from other persons, by words. With this is reached the critical point in the learning of language. That point is passed on the day when the child for the first time

uses a word of verbal language, or of the nurse's jargon, independently and correctly.

If we consider what is required for all this, and therefore for speech in general, it appears that there must be, first, an open ear, O, to receive and conduct the sounds heard; a permeable *impressive* path, as it is most briefly termed, beginning with the auditory nerves, O K. The sound-impressions arriving at a certain place in the brain, an acoustic center, or storehouse of sound-images, K, must then in the form of nerve excitement, quite probably through vibrations, come, through intercentral connecting fibers, to a part of the surface of the cerebrum situated farther forward, D, where ideas are formed out of them, and therefore where what is heard is understood. From here, partly also directly from the center for sound-images, K, go fibers to the before-mentioned Broca's center in the frontal brain, M, where the ideas are transformed into motor impulses for the laryngeal muscles by the expansion and contraction of the glottis, by means of the vocal cords, and for the lingual and labial muscles, etc. This place is the center that is often disturbed by attacks of apoplexy, and by the lesion or injury of which, through the rupture, it may be, of a small blood-vessel, language may be momentarily lost in part, and is in many cases wholly lost. In the first event the consequence is

dysphasia; in the second, aphasia. This speech center is not developed in the child, and if children grew up isolated from all human intercourse, it would not develop any more than would the other cerebral centers and their connecting fibers necessary for speech.

He who has not learned to write has no writing center in his brain. And as the child at a later time learns to write by imitating a copy, so in like manner he learns after the lapse of the first year to speak by imitating sounds heard. Imitation is the chief thing in all learning to speak, no matter whether the signs that constitute the language are visible, tactual, or audible signs. The word, too, is ultimately a symbol produced by feeling (or touching) with the tongue in the mouth, like gesticulation with the hands and the play of feature.

And although philologists may still dispute much over the possibility of the origin of language from other sources, nevertheless sound imitation is and remains without doubt the first and most important factor in the learning of language by the individual. No arrogant or even scornful rejection of the onomatopoetic theory, such as Max Müller announces by the term "bow-wow theory," no learned consideration of Sanskrit roots, no result of comparative philology, can shake the fact which everybody may confirm in the case of his own children if he only observes carefully and diligently, that through the repetition

of sounds heard the human being comes to associate these arbitrarily with certain definite ideas, in the connection in which they have been heard.

It is remarkable enough that the vibrations of the tympanum produced, in hearing, by the waves of sound, as early as at the end of the first year of life, and often much earlier, are transferred with the greatest accuracy to the vocal cords of the child that hears. A tone heard is sung correctly, a sound heard is repeated accurately with the same timbre, in the same pitch and about the same force; and yet the way, the path, must be open all through: from the vibrating tympanum through the auditory ossicles, the oval aperture, the fluid of the labyrinth, the cochlea, the auditory nerves, the auditory nerve ganglia, the fibers connecting with the cerebrum, the auditory spheres, and the motor centers of the cerebral cortex, as well as the motor nerves for the laryngeal muscles. First, sound-vibrations, hence condensation and rarefaction of the air: then, vibrations of solid bodies, the tympanum and the auditory ossicles; next, vibrations of a fluid and of the elastic ends of the auditory nerves in the labyrinth; after this, nerve excitement; finally, transformation of this nerve excitement into the sensation of sound. Out of this arises the idea of tone, and then the will to reproduce the content of it; following this, motor command in the form of centrifugal nerve excitement, muscular contraction,

tension of vocal cords, contraction of the glottis, exhalation—lo! the tone that had been heard! What a chain of complicated processes, which must all take place in a perfectly definite succession, in order to the existence of a phenomenon apparently so simple as the imitation of a sound heard, an A! Yet so it is; and if a single link in this long chain is wanting —if the internal ear is injured, or if the auditory nerve does not conduct, or if the cerebrum declines its office, or the motor nerves of the laryngeal muscles, or if these muscles themselves are paralyzed—then the child does not learn to speak. On a very slight thread hangs the whole weight of the higher intellectual activity!

Of course, the recognition of this important fact does not by any means imply that nothing further is requisite for learning to speak than that these impressive and conducting paths should perform their normal function. But it is certain—and this is the chief point—that without this whole apparatus articulate speech has never been acquired, either in primeval times by any human being previously lacking speech, or by the ancestor of such a one, a being nearer akin to the brute; or in our own days by an infant, who likewise stands nearer to the brute than to the civilized man, in regard to his inability to speak. The further thing that is indispensable is something purely mental, viz., the association of a

sound, acquired by imitation and self-produced, with the experience gained in the perception of the sound. Experience brings to ripeness a certain idea. Now, if the sound which has always occurred along with the idea is heard by itself, that experience emerges anew out of the memory-image, and occasions on its part the production, which is a reproduction, of the same sound: so that when this sound is uttered we know that the child has this or that idea.

This will be made plain by an example. My little son touches with his hand the hot stove, draws back the hand quickly, and speaks the single word "Hot," very loud and distinctly. While he is doing this his countenance takes on an expression that one might describe by saying that his face was "lighted up." This was the first word of proper language that he used spontaneously with perfect correctness. The sound-impression "hot" had often penetrated his ear, and always in connection with the idea of a high temperature. Now the child gets for himself the experience that an object has an unexpectedly high temperature; he receives the idea of heat, and this idea calls up the acoustic memory-image "hot." Previously, the words spoken in his hearing, among them this one, had been merely "parroted" without meaning, and often in mutilated form; previously, too, the feeling of heat, or the pain felt on grasping objects too hot, had come, but without the knowledge of

the word "hot." Now the association of the two is accomplished, and only in this way—that some person, having burned himself or having taken hold of the kettle, had said in the presence of the child, "That is too hot."

In this way the child learns to know a great number of words of his future language, and learns at the same time to give names to his sensations, feelings, perceptions, ideas. Yet this is not the sole way that leads to this goal. A considerable number of words are at first used by him wrongly or in mutilated form, with reduplications and with abbreviations, in ignorance of the true meaning. The right meaning becomes clear to him only after repeated wrong use of the words. How often does the child that is learning to talk remind us of the illiterate person, who perverts words and uses them in a wrong sense, saying "conifer" for "corypheus," "abrupt" for "absurd," or "spiritual" instead of "spirituous" liquors.

A third factor in the learning of speech is of much less importance—the impressing of idea and word almost simultaneously, as when an animal is both seen and heard. Wholly original word-formation of this sort—pure onomatopœia, that is—is a thing not easy to observe. Children for the most part name animals, which they generally name by the sound, as "moo-moo," "bow-wow," "cock-a-doodle-doo," "quack," not spontaneously, but only after they have learned the

use of other words, and have often heard these designations employed by other persons. As to the expression "peep-peep" for a bird, however, I can positively affirm that it is a spontaneous invention of a child. Other imitations of voices of animals, and of squeaking, humming, snarling, whistling noises, are mostly given to children early in words frequently uttered before them; such words are not kept long in use because they are individual in their character. On the other hand, a bad thing connected with the learning of speech is this: that the parents, and still more the nurses and like persons, purposely talk with the child not in the ordinary language but in so-called "baby-talk." In this, one does not speak in the first or the second person, does not say "I" or "you"; but the aunt, in speaking of herself, says "auntie" instead of "I"; the child is put into the third person. The strangest malformations, particularly of nouns, are regularly preferred; e. g., "Huddup" (*Hotto*) for horse, "mimi" for milk, "by-by" for bed. Consistent with this but wholly needless, and in reality harmful, the members of the family seize on certain syllables that frequently recur in the babbling monologues of the child, and say them over again and again, in one form or another, to the child, in connection with closely associated ideas. By so doing they make difficult for the child a natural development, for he must by and by wean himself from all this; that which

at first seemed amusing, childishly naïve, and even clever, but is in reality artificial and affected, is later condemned as naughtiness, is visited with punishment, and must at all events be got rid of. To what purpose is this dead weight? Children should never, at the expense of their own natural development, become entertaining playthings to pass away the time for adults.

It is the same with provincialisms and improper interjections, even with individual peculiarities of expression, with accent, sometimes with cadence. All this is by many children imitated with great precision. It is not noticed, and by and by we wonder at the defective, indistinct, disagreeable enunciation of children. Even when there is no intention on the part of the adult members of the family of imparting to the child their peculiarities of speech, the repetition of such peculiarities becomes to the children a habit merely through hearing. It is supposed that they will at a later period break themselves of these, but they retain them usually for life. Here must not be forgotten what has been spoken of as decisive in regard to the earliest education in general—the suggestive effect of the conduct of the mother. Every look, every word, many movements of the limbs, are, without the knowledge of the mother or nurse, suggestions to the child—i. e., they determine his mental representation, and later his action. And particularly to

be considered in the matter of learning to speak is the lack of understanding of what is heard and seen. A fundamental axiom of the whole doctrine of psychogenesis is, that all children at the time of learning to speak understand, indeed, many more words than they can themselves utter; but they also say many words "mechanically" which they do not understand, and with which they do not associate the right meaning until later, and then mostly in consequence of disagreeable experiences from wrong applications of them, but sometimes in consequence of pleasurable feelings from the right application.

If the little child's defects of speech from the beginning of his life to somewhere about the fifth year are compared, with reference to the hearing and understanding of what is said to him as well as with reference to pronunciation and independent use of articulate sounds, syllables, and words for the expression of his own ideas—if his defects are compared with those that appear in later life, a surprising agreement is found. When an adult, in consequence of a stroke of apoplexy, lesion, or any cerebral disease, disorder of hearing, derangement of the functions of the larynx or of the tongue, lips, or even teeth, is deprived of the right use of speech, then the disturbances of speech, which have been carefully observed by various clinicists, are not merely somewhat similar in general, but are identical with those of the child just learning to

speak. The adult no longer speaks correctly, and no longer understands speech correctly, because his speech mechanism is no longer normally constructed. The child, on the other hand, does not yet speak correctly, and does not understand speech correctly, because his small speech apparatus is not yet fully developed in all its parts. In both cases the cerebral convolution concerned is not capable of its function. In the one, the watch does not go, because it is broken and therefore can no longer be wound up; in the other, it does not go, and can not be wound up, because it is not finished. It should be noted here that every normal infant understands many of the sound-impressions of animate nature and of inanimate objects at a time when he can reproduce by imitation hardly anything of it. He never develops perfectly without intercourse with adults, without prolonged practice in guessing at the meaning of acoustic impressions; and this very thing proves conclusively the importance of this practice for intellectual development in general, and for the development of the brain in particular.

The guessing or divining of the meaning is far more a matter of understanding the accompanying gestures and looks than of understanding the spoken explanations. On the other hand, every normal child, of his own accord, before he is able to imitate syllables, forms correctly all, or nearly all, the sounds that occur in his future speech, and many others besides

these; he takes pleasure in making sounds which will not be used at a later period, and will be lost. There is a lavish abundance of sounds of the most manifold character. Out of these a selection comes to be made, an unconscious selection, determined by the language the child hears spoken by those about him. Those sounds which prove to be of advantage in understanding remain in use; those which are of no advantage fade out, as it were, or fall away like dead leaves, just as do the useless crowing, squealing, cooing, grunting, whimpering, and all the numerous inarticulate sounds we have no names for that are made by the child in the first few months.

But this decline in the child's stock of sounds does not by any means take place in a definite order of succession any more than the acquirement of the sounds of language does, with the exception of a few sounds that appear in all human beings in the same order. The different languages are too unlike, and the influences of the members of the family upon children, even in the same nation, are too unlike for it to be possible that the preference of certain definite sounds to all other sounds should be repeated everywhere in a like order of succession. The *a*, *p*, and *m* sounds only, in which the tongue remains motionless in the mouth, are found in all peoples as the first sounds to be uttered distinctly; and by combination, *ma*, *pa*, *am*, *ab*, *ama*, *papa*, *mama*, are the first sounds to designate

that which appeases the disagreeable feeling of hunger, viz., food, and hence milk, or the source of milk, the breast, and likewise the mother herself. But this application is not made by the child first, but by the mother, who repeats the sounds made by the child—i. e., she imitates the child's utterance, and he then imitates hers.

The difference in individuals is very great also in the later time of the child's learning of language, when his vocabulary increases gradually and ever more and more rapidly. Apart from the fact that many children are fond of babbling senselessly in monkey fashion whatever sounds they happen to hear, while other children try in a more thoughtful manner silently to understand what they hear, the inanimate, dumb environment of the child determines his use of some words, particularly of nouns. A child growing up in a flat region of country will not be likely to see much of mountains and glaciers, valleys and precipices; the son of a farmer will much sooner name correctly all that belongs to cow-house and barn than will the child of a fisherman, for whom, on the other hand, it is easy to name all parts of the boat even before he can speak correctly in other respects.

In reply to repeated questions concerning the number of words mastered by a child at the end of his second year—i. e., the words he uses independently—I have received from various mothers, who have ob-

served carefully, lists which show that the vocabularies of nine children just two years old—eight girls and one boy—comprise, in the case of the smallest number of words, 173, and of the largest, 1,121 words. But these extremes owe their great variation probably far more to the difference in the way of observing than to the actual difference in the children; for in the one case the observer was very strict in excluding all doubtful expressions, while in the other case the words of a dictionary were marked, and the child was asked a question in the answer to which he might employ the word under consideration. In this latter case suggestion has probably exerted a strong influence to increase the number of words. The remaining seven children had each a vocabulary of four to five hundred words. In a single case observed by me, strangely enough not fifty words were completely mastered in the twenty-fourth month; but we can not from this infer anything abnormal in regard to a child. A great many more such collections of words must be made and compared, and much more accurate data must be at our disposal concerning the times at which the acquirement of words takes place, before we can draw definite conclusions in this department, which until recently has received no consideration. I am told that I did not myself learn to speak until toward the close of my third year; and the child of whom I said just now that he had not at the end of

his second year fifty words at his command is my own son; he, however, very soon made up his deficiency. In this matter we may naturally think of hereditary peculiarities, but, on the whole, heredity is at all events of slight importance in regard to the learning of speech. For experience demonstrates that every child can, by virtue of the extraordinary plasticity of his entire apparatus of speech, if he is removed early from his parents, learn to master any language whatever instead of his mother tongue, and just as perfectly as that.

A wonderful thing it seems, to be sure, that every human being that comes into the world in sound condition shows no trace at first of articulate speech, and yet after a year's time has in part acquired this extremely complex function. For he can acquire it only through intercourse with such as already enjoy the gift of speech and who serve as models for his imitation; while if we go back farther and farther in the history of mankind, we come at last to generations who had no such models. Every tradition —and language is a tradition—must at some time have had a beginning; but as to the nature of the beginning of this, the most important of the traditions of the human race, who would care to make positive assertions? One thing is certain: that imitation must have been previously developed. The imitation of natural sounds must in any case be con-

sidered as an essential element. A second element is the simultaneous utterance of sounds by a number of men engaged in the same kind of bodily labor (Max Müller): the sounds thus produced are afterward imitated by other persons. A third constituent is the explosive, voiced expiration of breath under stress of pain or of any violent emotion. All these must have co-operated to produce language. Imitation would naturally lead to the formation of root-words. Out of these, by means of the combination of words and the extended differentiation of them, has been developed at length the vast number of languages now spread over the globe and acquired by children through imitation of the speech of their kindred.

CHAPTER VIII.

THE FORMATION OF HIGHER IDEAS.

THE mere appropriation of words does not carry the development of thinking on the part of the child beyond the primitive state that existed before. Nor does the loose juxtaposition of the first nouns and adjectives in a sentence prove anything as yet in regard to the formation of higher ideas, of abstractions. For example, when the child who has accidentally pushed off his cup, filled with milk, from the edge of the table, tells his mother of it in the words, "Mik-mik—tarpet—papa—fie!" he does not in this rise above the standpoint of a person that is all through life feeble-minded, who would in like manner say: "[The] milk [ran down on the] carpet; [then came] papa [and said] 'Fie!'" The omission of a great many words, particularly of the articles, conjunctions and prepositions, but also of verbs and pronouns, is characteristic for this first period of the forming of sentences. But in truth the intelligent child has before this strung together these same ideas,

and like the uninstructed deaf-mute has expressed them by various inarticulate sounds, as is the case with many brute animals also. The difference is rather in the greater clearness of the manner of designating the ideas than in anything else. When a child has acquired words of his mother-tongue and begins to express his own thoughts in them, then he can better discriminate between these thoughts. Language is an important auxiliary to him in separating individual qualities and holding them permanently apart in his mind. It lightens the task of arranging and systematizing his stock of thoughts, which is daily increasing in extent.

Yet even with this verbal announcement of his own sensations, perceptions, and ideas of tangible, visible objects, he has not attained, by any means, an advance in the formation of higher ideas or concepts. For this advance he has need of two more intellectual processes, distinct though intimately connected with each other—memory and association.

The memory for words, and that for objects, are by no means the same. A man may have in his head, as is proved in the case of many linguists, twenty thousand, or even thirty thousand words—very likely more than double that number—without being able to represent to himself at once that which each word signifies. And *vice versa*, experienced naturalists can represent to themselves many thousands of different

microscopic forms one after the other without being able to designate their differences immediately in words so as to make these clear to other persons. But after the first baptism that comes with the grasping of objects with the hands, the thing and the word hold fast to each other, so that when the child hears the sound-impression of the word, he has immediately the sensuous impression of the thing denoted by the sound—has this partly in reality, partly in his imagination. If the thing is visible and tangible, the impression has, as it were, a higher degree of reality through the association of an object, that has been both seen and felt, with the sound that has been heard.

I long ago made the statement that the child's memory in any single department of sense is weak, and that during the period when he can not yet speak he remembers far more easily in case of the combination of two impressions belonging to two different senses than when limited to one sense. A recent observer—Prof. Mark Baldwin, of Toronto—has, however, furnished a particularly convincing proof that the memory is favored by such a combination of memory-images from two departments of sense.

The nurse of a child six and a half years old, with whom the child had lived for five months, left it for three weeks, and was instructed upon her return, first (I), to appear in her ordinary dress but without speaking; then (II), to speak in her ordinary manner with-

out being seen; finally (III), to appear and sing a song that the child had not heard during the three weeks of the nurse's absence. At (I) the child stared with a questioning look but gave no sign of recognition, and no sign, to be sure, of fear or antipathy as at the sight of a stranger. At (II) there was no recognition; the voice, therefore, did not suffice. At (III) the recognition was complete. Accordingly, the visual memory-image (the face) must have strengthened the auditory memory-image (the melody), and this strengthening may well have been a reciprocal one.

I know for a certainty that in recognizing persons not seen for a long time, in my own case and in that of many others, the hearing of the voice often first removes the doubt felt on seeing the face, and *vice versa*. Here we have a true association with which language has nothing to do. But if language enough has been acquired (by a child) so that the word heard awakens the remembrance of the speech, then a sufficient preparation has been attained to make possible, at the perception of new things, the remembrance of the word that had designated a similar thing before. Thus the word awakens the remembrance of an earlier experience; and a new experience of a similar kind, or even with one similar characteristic, awakens the remembrance of the word once earlier associated with this. If this association of remembrances with present impressions is just as reciprocal as in the ex-

ample adduced from the experience of a child without speech—and there is reason enough for assuming this —then we have the conditions for the formation of higher ideas that do not correspond to previous experiences. For when the new image does not correspond to the one previously impressed, and hence the old word does not clothe itself with the new impression, then one is constrained to designate the difference; and this difference is always something abstract.

All ideas are either individual ideas, i. e., sense-percepts, or general ideas, i. e., concepts. In the child all words, even if formed only by onomatopœia, are naturally very poorly defined, very comprehensive, hence scanty in content and vague; because the child has but few words at his disposal, and is obliged to express with these few vocables an overwhelming multitude of sense-impressions and their consequences in himself.

With the adult, the trained thinker, on the other hand, the concepts have a small extent and are sharply defined, and are in so far of more value—i. e., they have a more definite content and are clear. When a child who has observed that two callers, coming in one after the other, cleared their throats vigorously, founds upon this twofold experience the generalization that all men clear their throats when entering a room, he does not indeed proceed upon a false principle, but he makes a false application of a true prin-

ciple. It is thus that the young naturalist, not yet sufficiently guarded by experience and critical judgment, makes the childish error of inferring from the sporadic occurrence of iodine in wood the universal diffusion of this metalloid in the vegetable kingdom; as if from a few individual instances could be deduced propositions of universal validity, or as if the law that holds good of great numbers of instances could be applied to numbers not great. The derivation of new truths by induction from too small a number of individual instances, or the generalizing of particular perceptions that offer certain resemblances but are few in number, forms all through childhood the chief factor in the production of higher concepts.

The truth of this statement may be easily illustrated by daily examples from the life of any child. On the other hand, it is not so easy to understand that the abstract idea is arrived at through the above-mentioned difference between a new impression and an old memory-image of a similar impression, when both are retained in the memory with the same word, for lack of a proper word; indeed, the knowledge that this is the fact I believe to be new. Every time a new word is formed abstraction is involved; for the very necessity of designating a new animal, a new plant, by a special expression, in order to keep it separate in the remembrance from others similar to it, presupposes a comparison through which differences of qual-

ities are perceived. How much more must this be the case when it is not a matter of natural objects of a striking character like plants and animals, but of geometrical figures conceived by the mind, or of complex numbers and their functions! Without signs for these objects of thought, without letters and figures, a theory of numbers would never have existed. Further, it is to the development of subtile distinctions between ideas by means of words that we owe all our metaphysics and a great part of philosophy and theology, and no small portion of the science of law. Such a development is found only among civilized nations. On the other hand, ability as contrasted with knowledge, art as opposed to analytic science, has less need of an abundant stock of language, of sounds and of numbers, in order to reach the highest achievements. The child has the advantage of not being able to turn away from the actual that directly surrounds him—as he might through overculture in the use of abstractions be turned either by too frequent naming of the same thing with different words, or by too subtile distinctions between similar concepts —until instruction, especially in grammar, forces him to it. Even after the child has gradually learned to decline and conjugate, and is beginning to master syntax, language serves him rather for the expression of his own experiences, the communication of them to others, particularly to those of his own age, than

for the conscious formation of higher concepts. All that he learns of these higher concepts is impressed upon him by adults, or at any rate by older brothers and sisters and relatives—he is inoculated with it as with foreign matter.

If it were not that the right time is far too rarely considered, no great objection could be made to the substitution of learning through the tuition of others in place of the predominant self-tuition in childhood. For there comes a time, after speech has been acquired, when the higher ideas of God, immortality, freedom, eternity, the everlasting, nothing, death, and, further, of duty, responsibility, self-control, virtue, and many others, must be taught to the child. Unfortunately, however, the beginning is made too soon with everything, at least in most families, so that the word comes before the possibility of understanding at all the idea associated with it. The best way, undoubtedly, of teaching a studious boy methods, and all the difficult abstract matters that are in every science indispensable for progressive development, is to proceed genetically by describing to him how the first discoverers and inventors arrived at them.

Herein consists the truly reformatory service of the much misunderstood Froebel—that he allowed children themselves to invent and discover; that by education, or rather by his educational instruction through work, he brought to an independent unfolding, even

in early youth, the original, and therefore hereditary, good talents of the little ones, but would not listen to the claims of the method of presenting the abstract prematurely.

Hence the genial originator of the plan of the new German school, Hugo Göring, is perfectly right when he desires that the child, in his first school instruction, shall not first learn what has been learned by others, but shall be led to understand what he has himself experienced.

By this course the pleasure in learning is far greater than in the ordinary *doctrinaire* or dogmatic course, and that which is learned is impressed upon the mind much more permanently. For myself, I am absolutely incapable of fixing in my memory a series of words devoid of meaning, jumbled together; and I could never in my youth retain the witch's multiplication table in Goethe's Faust, although I very easily learned by heart ballads and other connected poems, and easily kept in my memory dates and places. In fact, it was never possible for me to retain for a longer time than a few minutes twenty words put together arbitrarily without meaning. And yet we require a child to do this when he learns phrases and vocables the meaning of which he does not understand. Why we do it is not to be discerned, for the only alleged motive—viz., that children must learn much merely to forget it afterward—will not be accepted seriously by a

true friend of the young. Children learn of themselves, by imitation, far too much that they have to forget.

The process, which is certainly a purely psychical one, of the formation of concepts may be brought a little nearer to our understanding from the physiological point of view by the consideration that all concepts, even the highest, ultimately come to exist only after a great many sense-impressions have been received. These impressions, taking effect especially through the eye and the ear, but also, particularly in childhood, through the sensory nerves in the finger-tips, the lips, and the tongue, will naturally very frequently cause excitement of the same nerve paths, along with the same central portions of the brain, because they agree with one another. For example, far more tones from the third octave and the fourth octave will set into activity the extremities of the auditory nerves in the inner ear than from anywhere else in the range of tone, in hearing either spoken words or any kind of music. The lowest and the highest tones are therefore not audible at all to many people for lack of practice. So, too, with the light that is of medium wave-length, with the temperatures that lie about equally distant from the highest endurable degrees of heat or of cold: For the reason that such a medium stratum of sense-impressions in the scale of sensations in every department of sense is from the moment of birth employed more frequently

than the other strata, there comes an adaptation of the whole nerve mechanism to it. The nerve fibers that by means of it come first into activity as the leading ones respond more and more readily, and probably offer less resistance to the stimulus that has often before been felt, and is therefore not new; so that in the central portion also the ruts are, as it were, easier to travel in. The connections of different impressions with one another—e. g., of tactile with visual impressions in seizing objects, of auditory with visual in the tearing of paper, of tactile with auditory in the clapping of hands, of taste and feeling in the sucking of milk—presuppose organic association-paths in the brain. And whether these are located in the portion called by Charcot the *carrefour sensitif*, or in a different tract, or in several places, it must be regarded as extremely probable that, in case of strong excitement of a sense-center, there will be produced an accompanying excitement of the one that has very often been excited along with it through an external impression which, while it was single, yet distributed itself between two senses.

This view supplies a physiological basis for the old law of the association of ideas, and we can well conceive that when one of the very numerous, extraordinarily thin, connecting fibers and protoplasmatic plexuses in the cerebral cortex becomes impassable in advanced age, the memory weakens; a memory-image

emerges, and the fellow of it no more presents itself. A new sense-impression then remains isolated, or awakens, through accompanying excitement, only such memory-images as have from the days of youth been impressed with special strength, the rest being too quickly obliterated, and no more coming to realization in the dulled visual or auditory or other sensory sphere. It must be assumed that these spheres in age, whether through deficient nutrition or through decrease of the plasticity of their protoplasm, gradually become less capable of their function, or waste away through consumption of the protoplasm, whereas in childhood the case is exactly reversed—the spheres are not yet capable of functioning on account of incomplete development, lack of material for forming tissue, and, in particular, lack of impressions to be realized by them, which, as we know, can not reach them until after the first month of life. The number and variety of the impressions is doubtless in the external world the same in earliest youth as in extreme age, but in both the capacity of the cerebral substance to realize them is far less than in middle age. The child can not yet form concepts out of them; the aged man can no longer do it. The latter is "grown childish" because his cerebral cortex, like that of the child, does not perform its function.

There is a very remarkable agreement in regard to the beginning of the formation of concepts, one which

will probably be confirmed without exception in every family on the globe, if we take the trouble to examine more closely the behavior of the newborn, and of infants among savages. This is the identity of the first ideas formed by children in general. There has long been a lively dispute as to the possibility of so-called innate ideas. The question now takes a different turn, for, beyond a doubt, no mental representation can be inborn in any human being. The representation, or idea, can not arise before perceptions exist—i. e., before sense-impressions of various kinds have been co-ordinated in time and space. And even after the attainment of this first stage of activity of intellect, a further step is still necessary, as I have shown, for the formation of an idea, viz., the seeking out of the cause of that which is perceived. Now, all this can not be done by a newborn child. He is not yet capable of perceiving anything. But if we consider that all newly born children pass the first period of life under very similar circumstances—that they sleep during the greater part of the twenty-four hours of the day, that they devote a large portion of the day to the taking of milk, and that they let the remainder of their waking time go by passively while they are being washed, clothed, and taken care of—then we see plainly that the first sensations, and the perceptions that go with them, must be very similar in all children—must, in fact, be identical. The thing in

which the intellectual life of the first few days, and even weeks, centers, as far more important than anything else, is nourishment, food; or rather, to speak from the child's point of view, that which removes the disagreeable feeling of hunger and thirst (p. 18), and produces the pleasurable feeling of sweetness, of sucking, of moderate warmth, in the mouth. We can not, however, incline to call this most important thing, viz., the idea of milk, an innate idea; we might much better call it hereditary. But this expression would not be quite correct, for there is nothing innate here but the tendency and capacity to form such a product of thought. The sensibility is innate, and this is hereditary; innate, also, is the intellect, which very early associates the milk with the removal of the hunger, without associating it in the least with its indispensable value as food. The intellect, too, may be called hereditary, but its functions are always dependent on external impressions; and it is only because these agree in all children in the first period of life that some of its activities appear to be innate. The case is similar to that of the inheritance of teeth, of the beard, and the color of the hair, and even the color of the iris. The teeth are very often found to be of such form and arrangement in children as in the parents and grandparents, although the teeth are not innate, but only their potentiality. The form and color of the beard are very frequently hereditary, but

a full beard is never innate. Almost all children come into the world with blue eyes, while brown, gray, and greenish eyes are not seldom hereditary. It is much the same in the intellectual sphere. The tendencies which, along with the sensibility, like germs in the seed-corn, are in the strict sense of the word inborn, lead to perceptions and ideas which are not in the least inborn, but which must be called hereditary because they come forth out of these tendencies just as necessarily as the teeth and hair come forth out of their inherited tendencies.

It has often been overlooked that in animate nature, as well as in inanimate, the necessity of an event is inevitable if the requisite conditions are fulfilled. Just as little as a metal can contract while it is heated, just as little as it can expand while it is cooling, so little can an inborn tendency remain undeveloped when the external conditions of development are given. Intellectual tendencies, talents, genius, inherited good qualities of character, must unfold themselves when the conditions of development in general are given, as surely as a rightly constructed clock that has been properly wound, and has had its pendulum put properly to swinging, must move its hands. The notion of Lichtenberg, that a man should not say "I think," but "It thinks in me," has special force for the first stages of thinking in the child; it *must* think in him. In consequence of external impressions act-

ing always in the same way during countless generations in the human race, and even in the mammals, in the very first period of life, the child has in every instance adjusted his brain to the same way of receiving nourishment through milk, and to what goes along with that; and hence it can not seem strange that all human children in their very first period of life think precisely the same thing, and are not distinguished from one another by any kind of "ideas." At most they show differences in regard to the particular times, the dates, at which the divergence of their natural predispositions appears. But these differences are very slight in comparison with the vast difference in the opinions, knowledge, qualities of character and passions, of adult men and women.

A differentiation is effected in the intellectual sphere, particularly during the learning-time of the boy and the girl, which resembles in many respects the differentiation of growing forms in the animal and the vegetable kingdom. This I have already indicated with reference to another matter, at the end of the fifth chapter. The similarity of eggs or germs is often so great that nobody can discover the least difference by observation, no matter how searching the microscopic, physical, or chemical examination; and yet in the course of development the variation of the forms becomes plainly visible and can be discerned without special means of investigation. Nay, more:

in the early stages of development of the egg of the animal, during the segmentation of it, the products of segmentation, the formative cells, which come into existence through the segmentation, often resemble one another so much that nobody can tell by looking at them what they will soon become, and it is all the same whether we are dealing with a sensory organ, a motor organ, respiratory apparatus, or nutritive, etc. All is at first apparently quite homogeneous—at any rate, undistinguishable by a human eye; and yet every part must be different from every other, different in hereditary, indestructible qualities, otherwise there could not proceed from it, in the comparatively short term of the progressive development of the egg, the wide variation of all the internal and external portions of the growing organism.

Very much the same is it with the mental activity of the child. In the beginning the mental germ (one might speak figuratively of a mental egg) is for the observer homogeneous in its various parts, and in it the various directions of the coming development are not yet discernible. Soon, however, these come plainly forth, when the higher activity of the senses has progressed from general feeling to a separation of the special sensations and to perception. But even at this stage all children resemble one another, for the reason that in all of them this first intellectual differentiation has been going on in the same way for count-

less generations. A stability, or faculty of persistence, comparable to inertia in the inorganic world, to which we give the name heredity, is so pronounced, that the extremely insignificant variations in the environment of newborn human beings can make no further change in them. These variations do not produce their effect until the period of later childhood and youth; then with them the means of education co-operate to modify the condition and character of the human being.

CHAPTER IX.

THE DEVELOPMENT OF SELF-CONSCIOUSNESS.

THE relation of consciousness to self-consciousness has had so much thought expended upon it for centuries, while yet so little has become generally accepted concerning it, that one can not help wondering when he sees that the only way that can lead to the settlement of the differences of opinion is almost entirely neglected. This way is the accurate observation of the child at the critical period when he properly discovers himself, distinguishes himself from other bodies living and inanimate. But what is the meaning of "he" and "himself" when thus used? Is there not in the mere juxtaposition of these two pronouns, both of which indicate the same being, viz., the child, an assumption without proof? What can we mean when we ask the question, "At what time does the child distinguish himself from other persons, and how does he come to make this distinction?" What is it, then, that distinguishes? and what is it that is distinguished?

Evidently we must advance here step by step from the first phase in the child's life when there is no "I," paying especial heed to the behavior of the child in his perception of the members of his own body and his perception of foreign objects seized by him. There is not the least reason for assuming in advance that every human being comes into the world endowed with complete consciousness of self. Still less can we adopt the old view (now, happily, an antiquated one), that at the moment of birth an immortal soul is in waiting, as it were, for the new and as yet unconscious citizen of the world in order to take possession of him forever. The tiresome disputes of the lawyers as to the time at which a human being may properly be regarded as a particular individual are just as fruitless for the question in hand as are the speculations of earlier and, for that matter, not yet quite extinct philosophers concerning the absolute permanence of the soul as a being independent of its receptacle, the body, or at any rate separate from it. Impartial physiological investigation shows even in the adult, beyond refutation, a persistent dependence of every mental activity, not excepting the highest, upon the nervous system, and in particular upon the cerebral cortex. If the cortex is injured, the mental activity can not remain normal. But a lowering of this activity, extending so far as to complete extinction of what we call mind, takes place when the brain

is free from injury, during dreamless sleep and during the chloroform narcosis. And any one who, in order to save the uninterrupted continuance of the consciousness of self, goes so far as to deny the possibility of absolutely dreamless sleep, or of a swoon involving complete insensibility, will always have to remain a debtor for the proof of his assertion.

Now, if neither the uninterrupted continuance of conscious mental activity in sleep nor its independence of very finely organized tissues can be proved, while such a continuity seems rather to be wanting in the case of insane and hypnotized persons, then, taking our stand upon experience, we must question also the unity of this mental activity. Even if we had not the great number of observations we possess concerning a manifold consciousness, a double *ego*, an exchange of personality in hypnotized persons and in certain hysteric women and men, who can by no means be classed as insane—or if these observations turned out to be an incomprehensible series of errors—still conscientious observation of the little child would alone suffice to prove that the dogma, developed out of presumption and overestimate of self, of the immutability of the consciousness of self is absolutely irreconcilable with the facts.

This is shown by the answer that must be made to the questions that are first of all to be answered. How does the child come, in general, to the conscious-

ness of himself? Through what means does he distinguish himself from others? At this point I must call attention to something which appears to have been hitherto wholly overlooked, the behavior of all little children toward the parts of their own body. In the child who is born with all his senses, each sense contributes more or less toward the distinction of his own bodily members from other persons and from objects without life. The eye sees the arms, the hands, and the fingers, which can not as yet be counted, the legs, knees, feet, and the still less countable toes—all of which move. These parts are all plainly seen whenever anything definite comes forth in the field of vision—which at the beginning is made up only of vague areas, running into one another, light and dark, colored and colorless—and when accommodation, i. e., the ability to see objects at unequal distances with equal distinctness, becomes active. Then the child's eye sees also the breast and the abdomen, as well as the lateral portions of the trunk, the hips, much more seldom the shoulders, never the back, and of the head nothing, unless it may be the tip of the nose, in shutting an eye. The perception of the image in the mirror belongs to a later period.

But the clothes that cover the skin, which is visible in the bath and in bed, are likewise seen; and the retinal images of them must, since these objects undergo few alterations in the first year of life, impress

themselves as firmly as do the parts of the body, which remain almost unchanged in appearance, except that they are sometimes red, often pale, but always mobile and moved together with the clothes. Each separate part, of course, can only very slowly be impressed upon the memory through the sense of sight, along with the gradual development of the visual sphere; for as late as the thirteenth, the fourteenth, even the nineteenth month, and, in fact, toward the end of the second year, I have myself repeatedly perceived that in children perfectly sound and well developed their own arm appears to them something entirely foreign. In the fourteenth month a child bit himself in the upper arm, after having looked at it a while, standing up in his bed and holding by the railing with both hands, so that the marks of the teeth remained visible for a long time after, and he suffered pain from the bite. All children, it is likely, bite themselves now and then in the fingers, try sometimes in a passion to pull them out, or at any rate they pull with one hand the fingers of the other so vigorously that their movements scarcely admit of any other interpretation than that they want to get the fingers off; and it is much the same with the feet and toes. Little children like to get their toes to the mouth and to amuse themselves with these as with playthings, offering a biscuit to the feet as if these could share in the eating of it. Chickens when quite young peck at the

nails of their own toes as at grains of millet, and at inkspots on the table. Sometimes a child tries to get the whole foot loose from the leg when some one says to him, "Give me your foot" (for the purpose of putting the child's shoe or stocking on him). Here belongs also the careful looking at the hands and fingertips in the seventeenth to the twentieth week, before the child's attempts to grasp objects are perfected. When a grasp at the object has failed, children observe their hands, and when they have succeeded in grasping a thing they are fond of looking alternately at the object and at their hands. In the same manner, when by chance both hands have come in contact with each other in the numerous aimless movements of the arms, the fingers are scrutinized.

Thus the sense of sight combines with the sense of touch in the acquirement of knowledge of the parts of the body, from the second year on. The sense of touch, however, by itself furnishes much material in this direction; for when the child touches his own skin in the dark, or with his eyes shut, he always has two sensations of contact, that of the finger touching and that of the place touched; on the contrary, when he touches any object not a part of himself, he has only the sensation of the part that touches. When this difference is frequently repeated, as is the case with every child without exception, then it must become by degrees more and more clear. Moreover, the

child learns in this way to distinguish from one another the various forms of the separate parts of his body; e. g., the roundness of the chin and the flatness of the breast. The great mobility of the toes and the slight mobility of the trunk are felt. Further, there comes the distinction of unlike temperatures of different places. If the hand goes to the breast, it feels less warm than when it lies on the abdomen; in the mouth the fingers feel warmer than on the feet, on the forehead cooler than on the shoulder. Then is noticed the unequal hardness of the different places on the body. The hand coming in contact with the head, it experiences greater resistance than when it is laid on the stomach.

Through distinctions of this sort in the domain of the sense of touch and of temperature, the body, which has been felt of daily for many months, which at the beginning naturally seemed to the tactual sphere something just as foreign as any object whatever that could be felt, that was warm or cold, hard or soft—this body must gradually have less of the charm of novelty, and must therefore lose in interest. Thus the child becomes by degrees accustomed to the perception of the parts of his own body, and so to himself, in contrast with the strange, the new, the continually changing.

In this process two different departments of sense are already taking part in the formation of the I-feel-

ing (or feeling of selfhood). Not by any means that they necessarily work together from the start, since even children born blind get the same experiences of themselves through the sense of touch that seeing children do. The seeing *ego* is by a wide margin independent of the feeling *ego*. The hearing *ego* is yet to come. For every child, after some time, when it babbles and screams, when it laughs and shouts, and in particular when it tries to imitate sounds heard, hears with special satisfaction its own voice. And that this voice must make a different impression on his brain, must be turned to different account, be realized, in the child's auditory sphere, differently from any noise not made by himself or any series of sounds coming from without—of this there can not be a doubt. Another important thing is the frequent production of noises and sounds by the child's hands when he strikes them against his body, when he claps his hands, and when he uses foreign objects to make a din, as he often does with intolerable persistency. Every careful observer may perceive that the attention of the child is always strained in a peculiar manner when he himself is the cause of a phenomenon that produces noise. It affords much greater pleasure to every little child to sound any instrument himself, a toy trumpet or drum, than to hear other persons "make music" with it; and he would rather make a splash in the water than to hear

others do it. As soon as this point is reached the development of the consciously hearing *ego* is perfected. But we must bear in mind that this *ego* may develop quite independently of the seeing and feeling *ego;* for children born totally deaf have nothing of it, and yet their visual and tactual spheres are none the worse for the deficiency, but rather appear to be only the more acutely developed.

How it may be with the part played by the senses of smell and of taste in the development of self-consciousness, it is hard to say; for while both these senses, the most subjective of all, become active very early, it can not be perceived so plainly how far through them—through the realization, therefore, of the olfactory and gustatory impressions in the olfactory and gustatory spheres in the brain—the child's body is distinguished by him from other things. No doubt to the little child, as to the adult, the smell of his own skin, and of his clothing, is for the most part less disagreeable than that of another's skin and clothing; and there may be developed quite early in the babe, who commonly smells of sour milk, by means of olfactory impressions not suited to him (of tobacco, for example), a strong dislike of strangers. But the sense of smell leads so little to specific self-consideration that it can hardly contribute much to the development of self-consciousness.

The sense of taste may be of more importance in

this respect, since it introduces in the very earliest period of life the most agreeable sensations on the one hand (the sweet), and on the other hand extremely disagreeable ones (in the taking of bitter medicines). Of all general sensations, however, it is precisely disagreeable feeling, pain most of all, that is the most influential teacher in the distinguishing of the child's *ego* from other things, as I have already remarked. When the finger smarts after being put into the flame of a candle, as the arm does after a bite, it will not soon be put into the flame again; and the biting of the fingers very soon comes to a stop on account of the painful effect that follows; whereas the child likes to put the fingers of other persons, and objects of similar shape, into his mouth and to bite, even long before his teeth come, and he continues for a long time to grind his first teeth, which are to him a new plaything. He has not yet discovered with regard to all the parts belonging to his organism the difference between them and that which does not belong to him. When he has once apprehended this distinction, after having become accustomed to his own skin, his own limbs, he holds it fast for all the rest of his life—at least so long as his higher cerebral activity continues normal. In certain mental disorders, to be sure, the I-feeling (or feeling of selfhood), so toilsomely acquired through self-investigation, through pain and pleasure, through comparison of the experiences of all

the five departments of sense with one another, may be lost or become perverted, as is proved by the frequent self-mutilations of the insane.

One more factor remains to be considered in regard to the development of the consciousness of self, and one of essential importance. This is the connection of the higher nervous centers in the brain with the lower ones in the spinal marrow by means of the cervical marrow. Those animals only that possess a centralized nervous system have, in general, self-consciousness. Where this system is wanting, consciousness indeed may exist, but not self-consciousness; and where it is developed, we have, according to all the results of good investigations of experimental physiologists, not only the right but the duty also to distinguish various degrees of consciousness according to the seat of the motor impulses. Just as I have previously characterized the consciousness of the person seeing as not necessarily identical with the consciousness of the person hearing, feeling, smelling, tasting, so we must separate the consciousness of the spinal marrow, or of the cervical marrow, from the cortical consciousness of the cerebral hemispheres, that is to say, the proper higher *ego* or I. It has long been known that the tail of a squirrel, even after complete separation from the body of the animal, curls on receiving impressions producing pain, and makes adaptive movements as if the whole creature were there. So

in the case of eels without heads, of frogs and other amphibia without brain, and even of mammals after excision of the entire brain, numerous observers have established the fact of movements adaptive in a very high degree. I have myself seen in newborn mammals with no heads exactly the same sorts of movement as in animals not deformed, and have seen a human child, born without brain, cry and suck and make movements just like a normal child. It even showed the same mimical gustatory reflexes as the normal child, and must therefore, like that, have been capable of feeling. From this it follows that in normal children at the beginning of life the chief seat of self-consciousness, the cerebral cortex, is not necessary for the totality of their movements. The newborn human being appears to be only scantily developed. He is really *ego*-less, and all he can do is, without will or thought, to let his lower centers, in the cervical and the spinal marrow, operate. The newborn child must therefore be called irrational. He becomes a self-conscious being very slowly, during the development of his cerebrum. But even in the highest stage of development, in the years of complete maturity, the activity of the lower centers of consciousness can not be discontinued, because the brain is not able of itself to direct all the phenomena of the body that depend on the central nervous system, the processes of nutrition and excretion, of respiration and heart-activ-

ity, of generation of warmth, of growth, etc.; all these functions, rather, go on better without deliberation, without will—in fact, for the most part without conscious sensation—because in undisturbed regularity. But they continue through life to be dependent on the spinal and cervical marrow. Not until certain bounds that separate perfect health from disordered states are passed does the cerebral consciousness learn of the disturbance. And when this happens, most persons are not able to describe accurately the location and character of the pain; e. g., in oppression, colic, stitch in the side, cardialgia. Inasmuch as the messages sent by the spinal marrow and the peripheral nerves to the brain from these parts are seldom acutely discriminated—and the same is true of the painful feelings—the cerebral *ego* is not well informed; whereas in judging of changes in the field of vision, in hearing new words and melodies, and even in feeling new objects cold or warm, an account is far more easily given.

In this difficult question concerning the development of the self-consciousness of the *ego* of the cerebral cortex, we must ever bear in mind that this *ego* can not possibly be anything unitary, like the concept of the *ego* gained through pure abstraction, but, in proportion always to the prominence of activity of the one or the other sensory sphere, is impressed more strongly now in this direction, now in that. The dog

has a stronger olfactory consciousness, the vulture a stronger visual consciousness, than has man. But by way of compensation man enjoys a property of his central consciousness that belongs to no animal in the same degree, and which first makes him properly man, a responsible being: I mean the *regulative* activity of the brain. For the reason that the collective sense-impressions, in proportion always to their serviceableness for the unfolding of intellectual life, gradually lead to ideas, which in their relations with one another —now opposing, now supplementing one another— give rise to the voluntary movements, it becomes possible for man to shape his movements in general to correspond to the demands the world makes upon him, that is, to master it and thereby to act rationally.

To develop in the child (who, as has been said, utterly lacks it in the first period of his existence) this eminent property of man—to do this systematically, with constant reference to physiological considerations, is under all circumstances one of the highest problems a human being can propose to himself. Only when the consciousness of self has reached such a development that the child knows *what* he does and *what* he does not do, can he be made clearly conscious of responsibility for his actions, and so for the consequences of the thing done or not done. Then, out of *knowledge* (science) is developed his *conscience*. But to follow out these phases of mental development in

the child would carry us too far at present. That belongs to the theory of education. I prefer, in closing, to sum up briefly the principal results of the considerations presented in this chapter.

There are several grades of consciousness, lower and higher, which have different seats—in the higher animals, particularly in the spinal marrow, cervical marrow, and brain. The highest grade, self-consciousness so called, which does not necessarily imply a strong self-esteem, has its seat in the gray substance of the cerebral cortex. It is therefore properly called the cortical *ego*. Its chief importance consists in its regulation of the motor impulses issuing from the sensory spheres of the brain. These impulses come ultimately from sense-impressions which lead to ideas. It is, however, by no means demonstrated that the separate departments of sense necessarily produce, taken together, a unitary *ego*. Rather does the changeableness of character in most men, as compared with the very great rarity of persons so headstrong as to be immovable in all circumstances, argue a changeableness in the highest, central, regulative, self-conscious, mental activity. This can not, of course, be of the least detriment to the importance of the moral personality, of responsibility and self-control; for each human being, each child, and each mother, has never more than *one* conscience, and although the self-consciousness, or I-consciousness of the tactual sphere, is

doubtless not necessarily merged into a common *ego* with that of the visual and that of the auditory sphere —and as well that of the olfactory, and finally that of the gustatory sphere—still the experiences of one department may easily keep pace with the experiences of another, and these must in a clear intellect reciprocally correct and supplement one another.

CHAPTER X.

THE CONDITIONS OF MENTAL DEVELOPMENT.

THE foregoing exposition of some of the most important epochs in the mental development of the child is much too brief in proportion to the difficulty and the magnitude of the problem discussed; but it was not intended by any means to be an exhaustive treatment of the subject, but rather to stimulate individual observation and reflection on the part of others. And it serves to point out the ways and the aims that are most important.

The fundamental condition of all mentality is activity of the senses. Accordingly I began with the gradual awakening of sense-activity in the newborn human being, who comes into the world deaf and mentally blind, mentally without feeling, in general without mind, but rich, very rich in intellectual and moral germs, tendencies, aptitudes, which he has inherited in lavish abundance from his ancestors. Next were considered the sensations, which are gradually separated from one another, and the special feelings

that are differentiated out of general bodily feeling. These it is which, on account of the pleasure and the discomfort connected with them, chiefly determine the first behavior of the infant, and, being dependent in the first instance upon the excitability and impressionability of the nervous system, influence the development of one or another temperament.

In regard to the first activity of the intellect, I stated that it consists in the co-ordination of all the possible sensations of the five senses (but not of the feelings that affect only the organs themselves) in time and space. A sensation of light or of sound, of touch or of temperature, once cognized as coming between two others in point of time, or as existing in a certain locality, or as situated in a certain direction, is raised to a perception. But not until, with further development of the understanding, a cause is found for that which is perceived, is generated the last and highest product of the understanding in the stricter sense, the idea. This, on its part, through its limitation to the concrete becomes a sense-percept, and through abstraction of qualities common to many ideas becomes a concept, i. e., a more general idea. The combination and separation of ideas constitutes the essence of thought. Every child learns of himself to think, since every child brings with him into the world, as every living thing does, an ability to discriminate. Along with the capacity

for discriminating is given that of comparing; and here is manifested the remarkable preference for uniting the agreements of unlike things rather than separating the differences of similar things, in the first period of development.

It is in a quite different direction that the older child, or rather his growing brain, enlarges his clear ideas, ordering his original, aimless, often ill-adapted, inborn, impulsive movements to accord with the motor ideas acquired through the perception of the more rational movements of other persons. The reflex and instinctive, as well as the original, inborn, hereditary, impulsive movements, are by degrees repressed, and in part controlled, as compared with the imitated muscular movements, particularly those of the tongue, the imitations of sounds. By means of continual reciprocal action of the motor impulses that give the child pleasurable feelings and abolish unpleasant feelings the will emerges in its purity; and the riddle, how the perfectly will-less newborn creature becomes in his second half year a being that evidently moves voluntarily, appears somewhat less dark when we consider that, unless clear ideas of the action to be performed precede the action, no willing is at all possible. The whole development and perfecting of the child's will is manifested most plainly in the learning of speech. Here the error of the old theory, that the intellect has its origin in language, is demonstrated

beyond denial. Just the reverse of that is true. Only he who has already much intellect, more than any brute has, can learn to speak; for articulate speech requires two things: above all, hearing and *understanding* of what is spoken (or, in the case of one born deaf, the perceiving of what is spoken through the sense of sight or of touch); next, the expression of one's own ideas by means of quite definite co-ordinated muscular movements, together with the employment of breathing, and in the great majority of nations, of exhalation exclusively.

Taken altogether, it has been found that speech is a higher development of pantomime. By means of a great number of gestures and an extremely subtly developed play of feature, uninstructed deaf mutes understand each other at this day, just as in primeval times, without doubt, did primeval men who were ignorant of speech. And what we know in general of the most ancient languages shows so great an agreement in regard to the most important characteristics of the language of children at the present time, that we may say the human race as a whole has behind it a course of development in this matter similar to that which every normal child goes through in learning to speak. Nor can it be doubted that the formation of complex ideas, of higher concepts, therefore, which is favored in such an extraordinary degree by the acquirement of speech in the case of the child, was ad-

vanced and completed in like manner in the case of the primitive man, and continues to be thus advanced and completed in the savage of the present day. It is not the knowledge of words that begets intellect and facilitates thinking; it is abundance of ideas, and hence of thoughts, which grow out of the combination and separation of the ideas generated by sensations and perceptions. These ideas, however, must first be sharply separated from one another before they become available for abstractions of a higher sort and for new combinations; and the complete, sharp separation is made possible only by means of exact designation, and thus by knowledge of words, consequently by language.

It would, however (let me emphasize this point), be quite preposterous to suppose that the childish intellect may be screwed up beyond its ordinary tension by pressing words into it as early and as long as possible, and that, too, in various languages; for it is only when words designate things well understood that they can have the value they have been shown to have for the development of the intellect. But for the brain of the child, which is at the beginning only slightly developed, nothing is perfectly intelligible except that which is easily perceived, sensuous, tangible, capable of being grasped—in general, that is directly apprehensible by the senses—not the abstract, which in every case can only have its origin in some-

thing perceived by the senses. For at the beginning precisely those portions of the brain of which I spoke —the visual sphere, the auditory sphere, the tactual, the gustatory, the olfactory spheres, and the areas of the cerebral cortex associated with the voluntary movements—are either not at all or only very little developed; and yet the brain weighs (according to Vierordt), at the end of the first year of life, two and a half times as much as at birth, and gains from that time on through all the rest of life only about one third more.

Through the light thrown by experimental physiology, and by pathological anatomy and physiology of the human brain, upon the connection of feeling, willing, and thinking, and even certain peculiarities of character, with the constitution of the superficies of the cerebrum (in dogs), it has become possible to gain an insight into the mechanism of the first learning.

Two fundamental rules are here to be kept in mind by every mother, by every educator of little children, continually; first, to *spare* the organs of sense and the nervous system; second, to *exercise* them.

In the matter of promoting or restricting the capacity—that unfolds itself sooner or later, always according to natural endowment—of forming higher concepts, it is in any case better to talk sensibly with the child who is learning to talk than to attempt to

put one's self artificially into his intellectual condition by using an artificial, childish language; for this kind of language will have to be unlearned later. And if, for example, the parents, in speaking with the child, do not use the pronoun "I," but call themselves "papa" and "mamma," and address the child not in the second person but by using his name in the third person singular, then they make much harder for him the correct use of the personal pronouns, and at the same time the important distinction between mine and thine. The point is, not at what time does the so-much discussed abstract concept of the "I," the self-consciousness, the being-myself, definitely appear, but at what time does the correct naming of it begin.

The gradual development of the "I"-feeling in the first and second years of life has been by me ascribed to gradual distinction of the parts of one's own body from other bodies. I called attention to the fact, that although all children without exception are in the first period of life egoists—they have sympathy, to be sure, and they share in the joy of others, but are chiefly set upon the satisfaction of their own hunger and thirst, upon securing agreeable conditions for themselves—yet they have no unitary consciousness of their self; the fact is, rather, that the separate sensory centers and motor centers are still in a striking manner independently active.

For the right fusion of the different elements of

the manifold "I" of the child—of the cervical consciousness that exists at the very beginning preceding respiration, for example, and of the spinal-marrow consciousness, with the later appearing "I" that feels, sees, hears—and for the formation of an individuality with firm character and sensitive conscience, heredity is often of still greater importance than education. I desire to say this, at the close of these considerations, with special emphasis. And yet I can not agree with the great Darwin in the opinion that the influence of education, as compared with that of heredity, is infinitesimal. For precisely the most important function of the brain, the regulation of all the bodily processes connected with it through the nervous system, directly or indirectly, and of all actions, as well as the right division of time, can not be attained, however superior may be the hereditary endowments, without the most careful selection of that which is presented to the sensuous perception in the season of youth. It has long been known that the development of this regulator depends directly upon the impressions received in youth, and thus upon education; and a particularly instructive example of this is furnished in the examination of the brain of the blind, deaf, and dumb Laura Bridgman, who was born in 1829 and died in 1889. At two years of age she lost her left eye wholly, but retained a slight sensation for large, bright objects with the right eye up to her

eighth year, at which time the right eye also became entirely blind. The child of two years had lost her speech completely along with her hearing; her smell and taste were partly gone. In this pitiable condition the child was reared with the help of signs at first, arbitrary signs of touch. She learned, among other things, to sew and knit. But in the year 1837 she was taken to an institute for the blind in Boston. Here the girl was taught and trained by the superintendent, Dr. S. G. Howe, with unspeakable patience. The name of an object, printed in raised letters, was pasted upon the object, and Laura was made to touch the word, and then the object. Next she combined the two tactile impressions. Then she learned to form the name of the object out of the separate letters, and finally, after a long time, she learned the individual letters. When she had made the important discovery that "the sign for an object could be constructed from the individual letters, the meaning of what she was doing dawned upon her. From this time on she had to be held back in learning, lest her health should be endangered." Although in her eighth year the sense of smell was still entirely wanting, yet she could at a later period tell the direction of the kitchen by the smell; at this time she distinguished sour better than sweet or bitter. "Her sense of touch and contact was very acute even for a blind person, and she was very sensitive to jar. As far as

could be discovered, she did not dream in visual or auditory ideas. She had more than fifty sounds by which she could designate acquaintances. She was, moreover, remarkable for her sense of order, neatness, and propriety." Through her sense of jar she could recognize the footsteps, and sometimes even the voices, of her acquaintances, her statement being that she "heard through her feet." By the sense of smell she could, in 1878, distinguish the odors of some more fragrant flowers, but cologne-water, ammonia, and onions only when quite strong. Bitter and acid she tasted less well at this time than sweet and salt. Her sense of touch was from twice to three times as acute as that of a seeing person. I have myself seen the facsimile of a letter quite neatly written by herself without assistance. She composed little poems. "A cane with knots on it was less pleasing to her than a smooth one, and an irregular knobbed stick than one with the prominences at regular intervals."

In the case of this person, who was deprived, except during her earliest childhood, completely of sight and hearing, partly of smell and taste, and was thus almost a being with a single sense, yet very sensitive, and who, in spite of all, owing to exceedingly careful regimen, reached the age of sixty, the examination of the brain showed that those portions which from youth up could not be brought into activity in the ordinary way through external impressions—viz., all

the cerebral nerves—were small; the gustatory nerve, the auditory nerve, and a nerve that moves the eyeball were stunted, particularly the tract of the optic nerves. The hemispheres appeared somewhat flattened behind, and the occipital lobe, in fact, smaller on the right than on the left, and the right *cuneus* much less developed than the left. This difference in the region belonging to the visual spheres is intelligible when we consider that Miss Bridgman, from her second year, was completely blind with her left eye, whereas with the right she "retained some sensation of light until her eighth year—enough, at any rate, to allow the development of the centers of the left side to go on." Further, the *insula* was found abnormally exposed in a manner corresponding essentially to the variations from the norm that are characteristic for deaf mutes [American Journal of Psychology, vol. iii, No. 3, On the Brain of Laura Bridgman, Donaldson]. All these, and still other peculiarities of the brain in this rare case, agree with the views presented here before the peculiarities were known, and with the results of experiments recently made by various observers upon animals. For instance, if an eye is removed from a newborn rabbit, the corresponding portions of the brain are found to be stunted in the adult animal.

Strong, then, as heredity is, powerful as its influence appears in the shaping of every organized being

at every step, still the influence of external circumstances may surpass it in a psychogenetic respect; and it is just here that is situated the center of gravity of a natural, a physiological pedagogy. Such a pedagogy must work, first of all, among the countless hereditary tendencies by means of consistent, suitable selection of auditory and visual impressions; then by all ways of regulating the movements, and later the actions, must work in the direction of developing the useful tendencies, those worthy of development, received from innumerable ancestors, as fully and harmoniously as possible; and, on the other hand, those tendencies that are harmful, often directly destructive to the child himself and to the society in which he grows up, must from the beginning be hindered in their development, stifled, as it were, in the germ. This is the meaning of the significant expression, "to bend the will of the child," a thing that is best done in accordance with the above-mentioned principle of the diversion of the attention.

But if in desperate cases, where the education of the child seems to present insurmountable difficulties, we choose to send him off at once to a reform school, folding our hands in our lap and solacing ourselves with the weak consolation that one can make no headway "against heredity," then we forego one of the very greatest advantages ascertained by experience. Precisely in the case of pronounced hereditary tend-

encies has education one of the most rewarding problems to solve through favoring the good and opposing the bad. The child of a drunkard or of an insane person may have most excellent qualities of character, may be talented in a very high degree; and inasmuch as the time will never come when such children will not be born, since no sharp boundary line between insane and sane can be drawn, and the marriage of persons of abnormal intellect can not lawfully be prevented, and cerebral disorder, like dipsomania, frequently does not manifest itself until after marriage, we must reckon with the existing facts. And here it is that among sound children of sound parents, also, in their education in the family, far too much that is unphysiological is done, and far too little that is physiologically necessary is done, in order to preserve the intellectual health through a correct dietetic of the brain. If this knowledge once makes its way into wider circles, then young and inexperienced mothers will of their own accord look about for means of instructing themselves as to what is needed for the education of their little darlings during the first years of life, and will not intrust them so much as has been the case to uneducated hired servants.

I am so often asked how, then, one must go to work in order to prepare himself properly for the observation and the regulation of the intellectual devel-

opment of the little child, that I can not refrain from referring once more to the book mentioned at the beginning—The Mind of the Child [vols. vii and ix of The International Education Series, D. Appleton & Co., New York]. But a full exposition of its contents would not be in place here. Let me rather close with the wish that all parents who read that book may be moved by it to take to heart more than they have done not merely what a blessing and what a transcendent source of happiness has come to them, but also how great is their responsibility.

THE END.

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